

General Dynamics World

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Hilliard Paige Elected President of Dynamics

Hilliard W. Paige has been elected President and a Director of General Dynamics Corporation, David S. Lewis, Chairman and Chief Executive Officer, announced last week.

Paige, who is now a Senior Vice President of the General Electric Company, will assume his new post at the General Dynamics Headquarters in St. Louis, Mo., later this month.

In announcing the action of the General Dynamics Board of Directors, Lewis said, "Hilliard Paige will add a new and unique dimension of leadership to our top management team. He brings to General Dynamics a wealth of experience, technical and managerial, after serving many years in progressively more responsible positions with a very fine and successful company—General Electric. I know I express the feelings of all our board members when I say we feel very fortunate to have found someone as qualified as Mr. Paige to be our President."

David Lewis has been serving as both Chairman and President of General Dynamics since late April when Roger Lewis resigned his post as President to become President of the National Railway Passenger Corporation, or Amtrak.

Paige, currently Senior Vice President, Corporate Executive Staff, at General Electric, has spent almost his entire career with General Electric in a variety of key engineering and executive management positions. He has had extensive experience in nuclear propulsion, jet engine development, space and missile technology and electronics and computers.

A native of West Hartford, Conn., Paige received a bachelor's degree in mechanical engineering in 1941 from Worcester Polytechnic Institute, Worcester, Mass. He joined General Electric upon graduation and, except for three years with the American Machine and Foundry Company, from

1948 to 1951, has remained with that company.

He rejoined General Electric at its Jet Engine Division and held a series of management positions on jet engine programs. From 1956 until 1968 he was with the company's Missile and Space Division, becoming General Manager in 1964.

Paige was elected a Vice President of General Electric in 1964, Aerospace Group Executive in 1968 and in 1970 he was named a Senior Vice President of the company.

Paige received an honorary Doctor of Engineering degree in 1962 from Worcester Polytechnic Institute. He is



HILLIARD PAIGE

a member of a number of professional groups, including the National Academy of Engineering and the Navy League of the United States, and is a fellow of the American Institute of Aeronautics and Astronautics.

He lives in Riverside, Connecticut, with his wife Dodie, and his son Hilly, Jr. His daughter Beth is married and is now living in Maryland. His daughter Debbie is in college at Hollins, Virginia. His family will join him in St. Louis this summer.

Silversides Launched, Keel Laid For Glenard P. Lipscomb

Top Department of Defense officials were at Groton, Conn. last weekend to take part in a submarine twin bill ceremony at Electric Boat Division.

They included Defense Secretary Melvin R. Laird, Secretary of the Navy John H. Chafee and VAdm. H. G. Rickover, Director of the Navy's Nuclear Propulsion Program.

Occasion was the launching June 4 of the Navy's 100th nuclear submarine, Silversides, christened by Mrs. Chafee; and the keel laying June 5 of the Glenard P. Lipscomb, nuclear powered turbine-electric submarine named after the late California legislator who served nine terms in Congress and at the time of his death last year was the ranking Republican member of the House Defense Appropriations subcommittee.

Mrs. Lipscomb was present to weld initials on the keel.

Several members of Congress who served with Congressman Lipscomb also attended.



Secy. Laird

Participating in the ceremonies were David S. Lewis, Chairman of the Board of General Dynamics, and Joseph D. Pierce, General Manager of Electric Boat.

(Complete photo coverage will be forthcoming in General Dynamics World of June 23.)

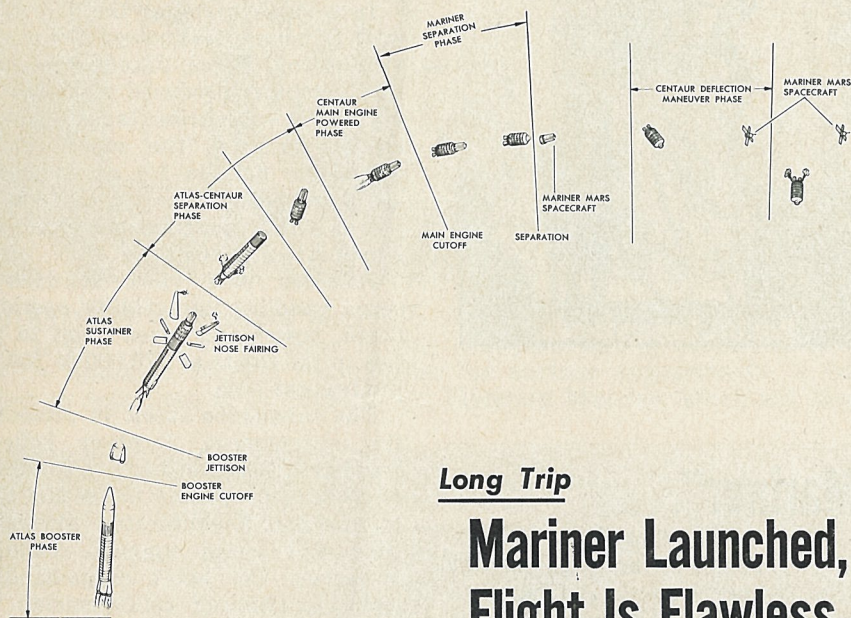
St. Louis Move Well Under Way

General Dynamics' phased move of the Corporate Office from New York City to the St. Louis area is proceeding on schedule—and that's no small accomplishment.

At the time the decision to leave New York was announced in February it had not been determined where in the St. Louis area the Corporate Office would be located.

By early March it had been decided that the new Pierre Laclede Center in suburban Clayton was best suited for the Corporate Office. And four floors—all at that point lacking interior walls, floor covering, doors, etc.—were selected.

Barely 60 days elapsed before the (Continued on Page 2)



SEQUENCE—Sketch shows sequence of events as Atlas-Centaur sends Mariner on its way.

'World' Makes Debut Today

Volume One, Number One, General Dynamics World.

This doesn't happen very often in this day and age of diminishing numbers of news publications. It is no coincidence that so many newspapers of general circulation have combination names, the result of past mergers; and even the most long established have a few ancestors whose names have been lost in the shuffle.

The World's ancestral tree includes not only The News, but The 'Scope, The Speaker, The Consolidator, Convairity . . . But now it's The World, with a new format and a new zest.

As to format, The World's major news pages are in four columns, 14 picas wide, without column rules. The body type is 9 point Century on a 10 point slug, for easier reading. Headlines are in Alternate Gothic and News Gothic. All are honest, time-tested type faces, carefully chosen for readability.

Current circulation of General Dynamics World is 75,000.



SALESGIRL—Stromberg-Carlson's new orange color telephones have been immediate sell-out. Maybe it was color; and maybe it was this beauty who posed for publicity photos.

Long Trip

Mariner Launched, Flight Is Flawless

A "story book flight" May 30 by Convair Aerospace-SD's Atlas-Centaur No. 23 sent NASA's Mariner IX on a 5½-month voyage scheduled to culminate in detailed orbital reconnaissance of the planet Mars.

The modern Mariner, the first U.S. spacecraft destined to orbit another planet, will travel about 280 million miles before reaching its destination—more than 1,000 times the distance from the earth to the moon.

W. J. Hammond, supervisor of test planning and control for Convair Aerospace-SD launch vehicle programs, said "fantastic accuracy" of the AC-23 launch meant that only a 2.15 meters per second mid-course correction would be needed for Mariner to achieve target point and arrival time.

AC-23 with its Mariner IX payload lifted off Complex 36B at the Eastern Test Range at 3:23 p.m., Pacific Daylight Time May 30.

Atlas booster powered the first 4.06 minutes with booster and sustainer engines before Atlas-Centaur separation.

A single burn of Centaur 21D's engines for 7.65 minutes then sent Mariner on flight toward Mars at about 25,000 mph.

Centaur's liquid hydrogen engines were shut down 11.9 minutes after liftoff and Mariner was separated about 95 seconds later. Centaur then was turned about 7½ minutes later and remaining propellants vented un-

(Continued on Page 2)

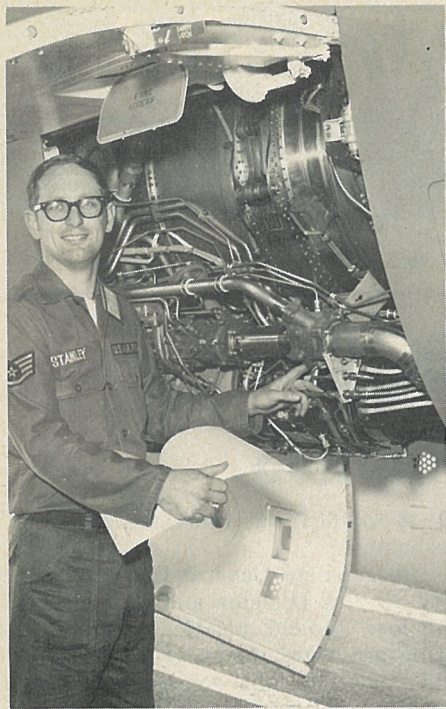
Christening Set For July

Miss Ashley Lykes has been named sponsor of DOCTOR LYKES, the world's largest dry cargo ship, which will be christened July 10 at Quincy Shipbuilding Division. Miss Lykes is the 17-year-old daughter of Joseph T. Lykes Jr., Chairman of the Board of Directors of Lykes Bros. Steamship Co., customer for the huge craft.

The naming of a sponsor for the revolutionary multi-modal carrier, first of three under construction for Lykes at Quincy, signaled the start of intensive preparations for the christening. The event is expected to draw a large gathering of public officials, maritime representatives and journalists from newspapers, radio and television.

As the first of a new class of ship known as SEABEES, DOCTOR LYKES will be, in the words of J. J. Henry, her designer: "The most flexible cargo carrier the world has ever seen." As a merchantman, for example, the SEABEES will be so productive that three of them engaged

(Continued on Page 2)



ACCESSIBLE — Air Force figures show F-111s are proving relatively easy to maintain — a feature that was designed into the variable-wing fighter. Easy-to-remove panels enable technicians to carry out most maintenance work from ground level.

"Move"...

(Continued from Page 1)
first phase of the move was accomplished.

On May 17 the first personnel to staff the 15th floor, which houses the Industrial Relations, Public Affairs, technical programs and planning and international departments, reported for work and found all was ready for them.

In addition to furnishings, files and office equipment from New York, they found in operation Stromberg-Carlson's CROSSREED telephone system. The CROSSREED system had been ordered, built, shipped and installed in time to accommodate its first Corporate Office users.

They found that unlike New York, where telephone troubles were the order of every day, they could get WATS lines and make long distance calls as fast as they could peck out the numbers on their push button phones.

They found their new offices to be tastefully decorated, well lighted and air conditioned with individual control. From their windows they looked out upon Clayton's heavily wooded residential areas and modern office buildings.

The second phase of the move was accomplished June 7, with the move of the Executive Offices from the 32nd floor at One Rockefeller Plaza to the 23rd floor at the Pierre Laclede Center.

Phase three of the move is scheduled June 14 when the 16th floor will be occupied. This floor will house administrative services, contracts, cost estimating, material, manufacturing and facilities departments.

The fourth and final phase is scheduled by June 28, when the 17th floor is to be occupied. This floor will house the financial and accounting operations—Treasurer, Comptroller, audit, payroll and cashier.

Careful planning and better utilization of floor space will permit a Corporate staff of comparable size to operate efficiently in 50,000 square feet of office space in contrast to the 70,000 square feet required in New York.

General Dynamics World

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F-111s Prove Easy To Keep Flying

When it comes to "keepin' 'em flyin'," Air Force technicians are meeting all goals set for the F-111.

During a recent 17-month period, tactical F-111s averaged 33.9 maintenance manhours a flight hour; FB-111As averaged 33.3 hours for such upkeep.

"These are Air Force figures," said Ed Mathis, Fort Worth senior project engineer. "They show clearly that the F-111, even though it's a very sophisticated machine, promises to be one of the easiest to maintain in the inventory."

The F-111 contract calls for a minimum requirement of 35 maintenance manhours per flight hour on tactical versions, 40 such manhours for the bomber.

"We're already beating these requirements," said Mathis, "and expect this time to be reduced to as low as 25 hours within the next few years."

"By reducing the time spent in maintaining F-111s, you reduce the aircraft's turnaround time—the payoff in combat. Equally important is the savings in tax dollars."

Mathis estimated that reducing the maintainability manhours by just one hour under the requirement—over the life expectancy of the F-111 fleet—would "save" about \$16½ million. A nine-hour reduction under requirement would save nearly \$150 million over the long haul.

Ease-of-maintenance figures were literally designed into the F-111.

Technicians can remove most of the panels and do their work without using ladders and other bulky equipment. In addition, the aircraft is designed so that technicians can change aircraft components easily, using self-testers to quickly locate potential trouble spots in avionics equipment.

"As an example," Mathis said, "avionics components in the F-111 are located conveniently in the forward equipment bay. Most of these components can be replaced by two men in about 15 minutes."

"The F-111 is the first aircraft designed throughout with the maintenance man in mind. The concept is now paying off."

Maintenance statistics during the 17-month survey were taken on F-111As and F-111Es of the 27th Tactical Fighter Squadron at Cannon AFB, N.M., and the 474th TFW at Nellis AFB, Nevada, and FB-111As of the 340th Bomb Group at Carswell AFB, Texas.

"Lykes"...

(Continued from Page 1)
in European trade, with their barges taking advantage of canals and other waterways, will replace 18 modern freighters now serving the same trade route.

Key to the SEABEES' versatility is the elevator and transporter system. The custom-designed stern-located elevator can lift two thousand tons, four



"Mariner"...

(Continued from Page 1)
ignited through its main engine nozzles to further separate it from Mariner's trajectory and insure it will miss Mars as it goes into permanent orbit around the sun.

"We had a lot of hard work done by a lot of people in preparation for this flight," Dan Sarokon, launch conductor, said.

Sarokon said NASA officials at ETR were "extremely pleased" with AC-23 performance.

Measurements taken by the spacecraft are expected to give scientists a better understanding of Mars' internal activity, mass distribution, and shape.

Jet Propulsion Laboratory is managing the spacecraft for NASA.

"Mariner IX-right on!" was the way Jet Propulsion Laboratory headlined its Mariner-Mars 1971 status bulletin of June 1.

"Both the Atlas booster and Centaur second stage performed flawlessly and placed Mariner IX spacecraft in the correct trajectory," the bulletin said. "Injection velocity for the spacecraft was so accurate that in the first trajectory maneuver only one meter per second (less than three miles per hour) of the correction will be due to launch vehicle injection error."

Axis stabilization of the Mariner is being achieved through sensor "acquisition" of the sun and the Star Canopus in the constellation Argo.

Atomic Subs 'Best Tankers'

Nuclear powered submarine tankers are the cleanest, most practical and economically attractive means of transporting oil out of the Arctic regions, according to Lawrence R. Jacobsen, undersea systems engineer at Electric Boat Division.

In a paper given at the Third Annual Offshore Technology Conference at Houston, Texas, Jacobsen declared that computer-produced mathematical models of submarine tanker systems clearly indicate "the superiority of submarine tankers for dependability, speed and costs in moving oil from the hostile Arctic environment to ice-free North Atlantic ports."

Jacobsen said that studies of cargo handling, navigability, operating depth, power and speed point to vessels in the range of 170,000 to 250,000 deadweight tons.

The submarine excels in protecting the environment, Jacobsen believes, "primarily because it avoids the threat of rupture by sailing below and clear of sea ice. Sophisticated navigation gear will guard against collisions. Moreover, the sub's cargo-handling and tank-cleaning arrangements will minimize contaminated discharges."

Other factors affecting submarine tanker economics, Jacobsen said, are the discovery and location of additional oil reserves, U.S. import policies, routes and terminals, all of which must be brought into a total system before construction decisions can be made.

The sub tanker has been proposed as a second generation marine transportation system to five major oil companies which are now reviewing the statistical data.

Two other Electric Boat Division engineers also gave papers at the conference.

Alan J. Pesch, human factors engineer, discussed "Performance Comparisons between Scuba Divers vs. Submersible Manipulator Controllers in Undersea Work," which he co-authored with fellow-engineers William F. Klepser Jr. and Robert G. Hill.

Michael Pakstys Jr. of Niantic, the division's chief of shock and vibration, gave a paper on "Dynamic Structural Analysis Techniques for Offshore Platforms."

Buckley To Be Panelist At Engineers Meeting

Ernest L. Buckley, administrative supervisor at Fort Worth operation, will be a panelist at the National Society of Professional Engineers' Conference in Washington, D.C. June 17 and 18.

He will discuss "How changing national priorities have affected engineering on the West Coast, Northeast and Southwest." Other panel members are Stanley Little of Boeing; Dr. Herman Lemark, Massachusetts employment security; and Frank Coss of Deutsch, Shea and Evans, N.Y., moderator.

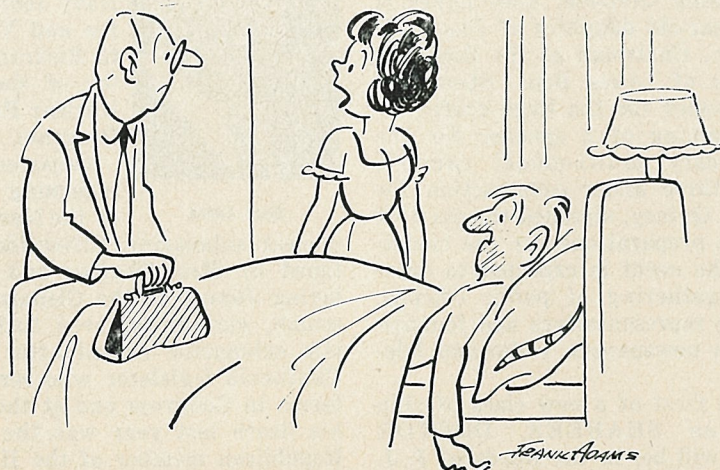
Buckley is also a research associate with the School of Engineering at University of Texas at Arlington.

Air Force Takes Delivery Of Four F-111s During May

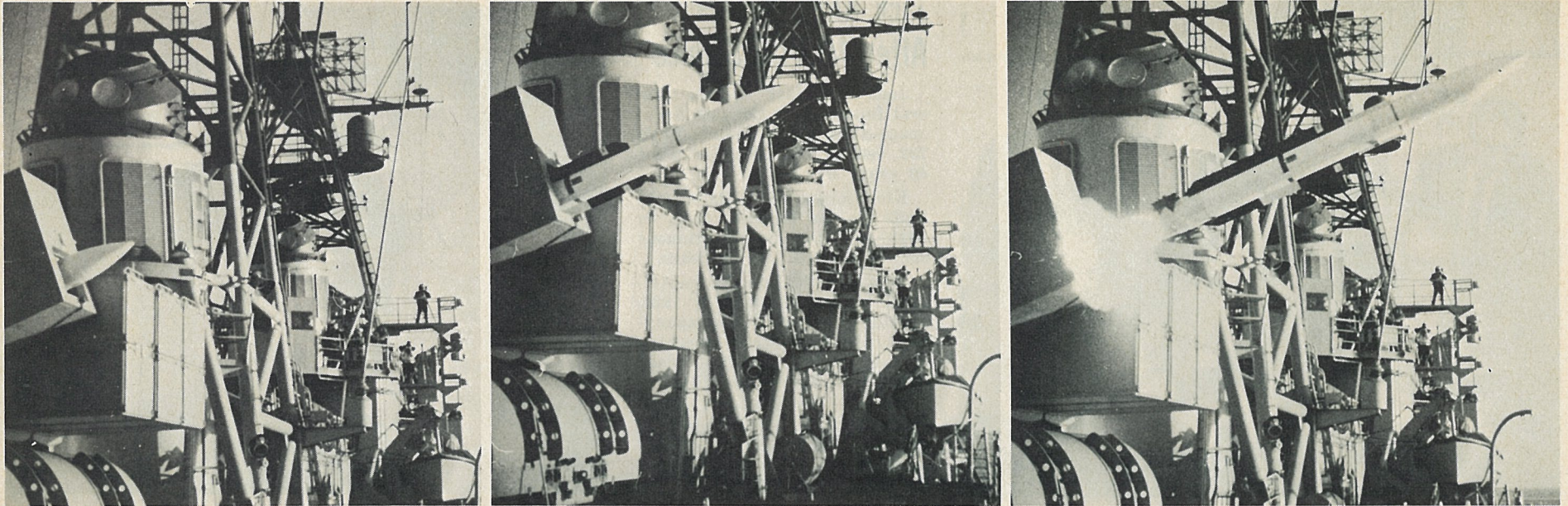
Air Force accepted four F-111 aircraft from Fort Worth operation in May—three new production planes and one on re-delivery.

F-111E No. 36 was delivered to the 27th Tactical Fighter Wing at Cannon AFB, N.M. Another F-111E, No. 68, will be delivered to the same unit in mid-June. The aircraft is being used to test a new modification kit.

F-111A No. 159 was ferried to the 474th Tactical Fighter Wing at Nellis AFB, Nevada, after completing a modification program. This marked delivery of the last "A" model in the modification block. A bomber, FB-111A No. 76, was delivered to the 340th Bomb Group at Carswell AFB, Texas.

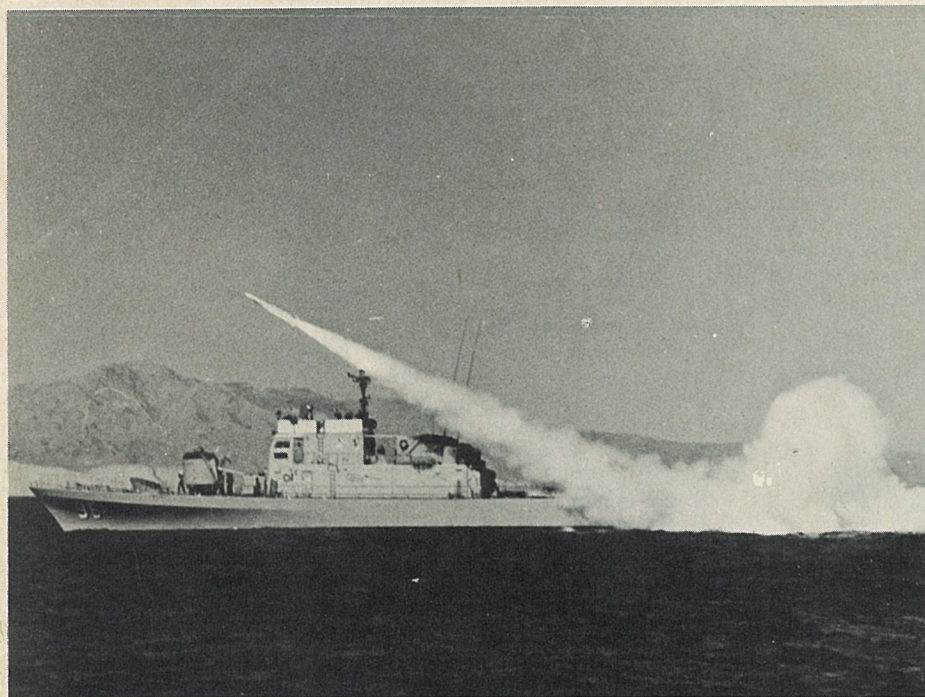
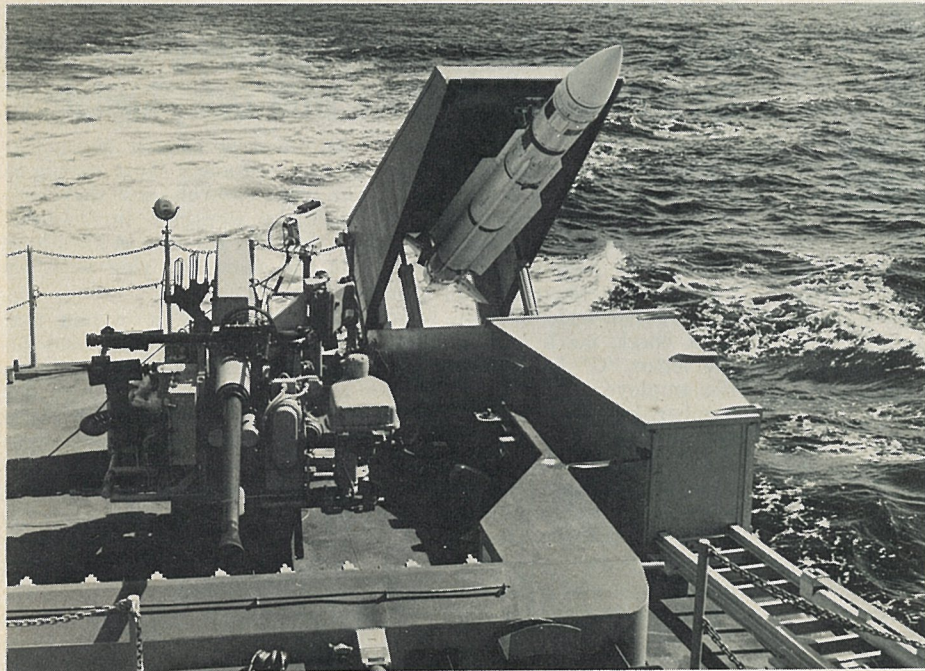


"He ate Thanksgiving dinner, then took a pill for his ulcer, then something for his gas, then something to keep him awake . . . Then he lit a cigar and there was some kind of explosion!"



BLAST OFF — Standard Missile is fired from ASROC launcher aboard U.S. Navy's John Paul Jones in this sequence during surface-to-surface test. A Standard Missile modification for surface engagements is being added to new class of DE-1052 ships. Standard Missiles, which will double

the bombardment range, will have springloaded fins for use with ASROC launcher. Standard Missile is produced for Navy by Pomona operation of Electro Dynamic Division. Standard Missile has been in production at the Pomona plant since 1967.



ARM TESTS — Standard Anti-Radiation Missile (ARM) is shown in special box launcher on U.S. Navy PG (patrol gunboat) ready for test firing. ARM is being tested for possible surface-to-surface use. Below, Standard ARM is fired from patrol gunboat in test against surface craft.

Roger Lewis Leaves General Dynamics To Become President of Railway Corp.

In a quarterly report to General Dynamics shareholders, David S. Lewis, Chairman of the Board and Chief Executive Officer, announced that Roger Lewis, President since 1962,

DatagraphiX, Aerospace-SD Lead First Quarter Safety

Stromberg DatagraphiX, Convair Aerospace Division's San Diego operation and Stromberg-Carlson hold the top three positions in "best record" category of the Corporate Safety Contest through the first quarter.

Stromberg-Carlson leads in "best improvement" in frequency rates and the Fort Worth operation of Convair Aerospace Division shows "best improvement" in severity rates.

has accepted the post as President of the National Railway Passenger Corporation, or Amtrak.

"We regret losing his services but we can understand his desire to take on the challenging and important task of streamlining the nation's intercity rail passenger service," David S. Lewis said.

The Board of Directors elected David S. Lewis to the presidential vacancy at an organizational meeting following the annual meeting.

"On behalf of the Board and all our employees, I would like to express our appreciation to Roger Lewis for his valuable and dedicated contributions to General Dynamics . . . I am happy to announce that he will continue to serve as a member of the General Dynamics Board."

People Mobility

Personnel Transfers Within GD

(Following are recent personnel transfers within General Dynamics. In parentheses are dates when individuals joined the company.)

DENNIS T. DRESSER (1969) from Convair Aerospace Division-SD to quality control engineer, Electro Dynamic Division-SD; ROBERT E. MORRISON (1957) from Stromberg-Carlson-Roch. to S-C-Orlando as manager of quality assurance; THEODORE A. VOGEL (1947) from ED-Pomona to Electric Boat; ROBERT D. ROBERTS (1966) from S-C-Roch. to senior engineering aide, S-C-Orlando; DOUGLAS J. CULVER (1956) from ED-Roch. to S-C-Roch. as production control supervisor; EUGENE H. FELDER (1969) from Convair-SD to senior manufacturing development engineer, ED-SD; SAMUEL MASTERS (1962) from S-C-Roch. to S-C-Orlando as manager of production; EUGENE P. PHELPS (1953) from S-C-Roch. to manager of production control, S-C-Orlando; JAMES A. GIULIANO (1963) from S-C-Roch. to S-C-Orlando as plant controller; ROBERT BLACKBURN JR. (1963) from S-C-Roch. to manager of production, S-C-Orlando; ARTHUR WRIGHTSON JR. (1968) from Convair-SD to ED-SD as senior management systems analyst; RICHARD E. FESS (1955) from S-C-Roch. to supervisor of manufacturing engineering, S-C-Orlando; BENTLEY J. YOAKUM (1941) from Convair-SD to general foreman, ED-SD; RICHARD A. KILLENBEC (1957) from S-C-Roch. to foreman, S-C-Orlando; CARMEN A. RICO (1960) from ED-Roch. to ED-SD as principal financial analyst; BERT H. HOERL (1958) from Convair-SD to senior engineer, ED-SD; FARREL L. PATTON (1959) from Convair-SD to ED-SD as principal financial analyst; BRUCE GRAHAM (1943) from Convair-SD to engineering drawings checker, ED-SD; ROGER M. HENKEL (1963) from Convair-SD to senior engineer, ED-SD; RALPH H. HALL (1941) from Convair-SD to ED-SD as senior test engineer; MILTON M. CHAZOTTE (1955) from Convair-SD to ED-SD, engineering laboratory manager; JOHN C. DOBYNE JR. (1956) from Convair-SD to design specialist, ED-SD.

Earl D. Johnson and Wallace R. Persons Join General Dynamics as Directors

Election of two new directors to the General Dynamics Board has been announced by David S. Lewis, President and Board Chairman.

They are Earl D. Johnson, business and financial consultant, and Wallace R. Persons, Chairman and Chief Executive Officer of the Emerson Electric Co., St. Louis, Mo.

Johnson was an officer and Director of General Dynamics from 1955 to 1963, serving as Senior Vice President and as President in 1959.

Persons, a native of Cleveland, Ohio, has been a prominent figure in the electrical industry for more than 30 years. He was educated at Case Institute of Technology, graduating with a M.S. in engineering in 1932.

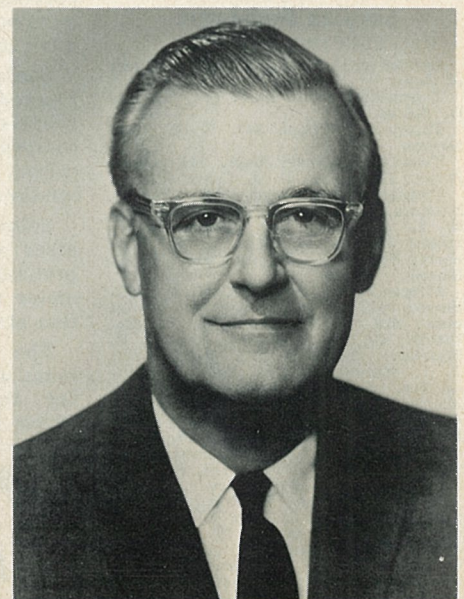
He joined Lincoln Electric Co., Cleveland, in 1935 as a sales engineer, rising to Vice President and Director in 1953. In 1954 he was named President and Chief Executive Officer of Emerson Electric Co. and became Chairman of the Board in 1965.

Johnson is a former Executive Vice President and a Director of Delta Airlines. In 1965 he became a business consultant as well as a director of Menasco Manufacturing Co.

Johnson is a former Assistant Secretary of the Army (manpower and reserve forces) and was made Under Secretary of the Army in 1952. Later he served as President of Air Cargo, Inc.



EARL D. JOHNSON



WALLACE R. PERSONS



GERMAN GUESTS — Three representatives from Messerschmitt-Bölkow-Blohm (MBB) Space Division in Munich, Germany, met with Convair Aerospace representatives recently in San Diego to discuss possible participation in Space Shuttle program. From left are (seated) Dr. Donald Dooley, Convair Aerospace Space Shuttle program director; Julius Henrici, MBB Space Division general manager; Frank Davis, Convair Aerospace Division president; and (standing) Ivan Rattinger, Convair Aerospace Space Shuttle program deputy program director; Hans Braendle, MBB Space Shuttle program director; Peter Wilhelm, MBB Space Shuttle deputy program director; and Al Schuler, Convair Aerospace Shuttle propulsion engineer.

RAM TEAM INTERCHANGE REVIEW CONFERENCE CONVENES AT SAN DIEGO

Convair Aerospace-SD was host for a Research and Applications Module (RAM) team interchange review meeting attended by representatives from NASA Headquarters, NASA Marshall Space Flight Center project office, and four contractor organizations on the RAM Phase B definition and preliminary design team.

W. W. Withee, RAM program director, said the meeting was one of a series in which Convair Aerospace-SD and the other three members of its team—Bendix Navigation and Control Division, North American Rockwell Space Division, and TRW Systems Group—provided details on team coordination and functional control of work they have been assigned.

Douglas Lord, director of the Space Station task force at NASA Headquarters, discussed Space Station and RAM relationships and Dr. Rodney Johnson, also of NASA Hq., discussed international aspects of RAM. Tom Barr of NASA-Marshall gave a RAM overview.

Visitors also saw Convair Aerospace-SD life sciences, erectable antenna, launch vehicle, Orbital Vehicle-1, DC-10 work, Space Shuttle, RAM mock-up areas.

Withee said the DC-10 line was of particular interest since RAM will be similar in size to DC-10 fuselage sections.

Briefings and tours also had been held previously at Bendix, TRW, and North American Rockwell.

Representatives from the four

US firms on a RAM executive steering committee also met for the first time.

Frank W. Davis, Convair Aerospace Division president, is chairman of the steering committee. Withee chaired in his absence.

Others present were M. C. Curtis, Vice President and General Manager of Convair Aerospace-SD; R. F. Carlyle, chief engineer, representing C. E. Rowett, vice president and group manager of Bendix Navigation and Control Division; E. G. Cole, earth orbital systems and Space Station program manager for North American Rockwell Space Division; and G. A. Harter, general manager of the Space Vehicles Division of TRW Systems Group.

European representatives are to include Dr. H. Tolle, space programs and projects department head for ERNO of Bremen, Germany; Julius Henrici, general manager of the Space Division of Messerschmitt-Bölkow-Blohm (MBB) of Munich, West Germany; Ingemar K. Olsson, general manager of the Missiles and Electronics Division of Saab-Scania of Linköping, Sweden; Osvaldo Abbondanza, director of marketing of Selenia S. P. A. of Rome, Italy; and an executive to be designated by MATRA of Villacoublay, France.

ERNO is to handle materials science and manufacturing in space experiment tasks and MATRA the on-board data management and attitude control studies.

MBB will be responsible for integration of structure, meteoroid protection, and thermal control radiators; propulsion and reaction control subsystem; solar arrays; and RAM system cost analysis.

Saab-Scania tasks will include phased-array antennas, data processing and image motion compensation, optical communication, and computer trade-off studies.

Selenia will handle multiprocessor computer conceptual and preliminary design, and millimeter wave communication system studies.

The Convair Aerospace-SD team won the contract in April for the one-year \$2 million Phase B study.

Jack Kline Retires After 40 Yrs. Service

John M. "Jack" Kline, general foreman for Convair Aerospace-SD's sheet metal Dept. 732, retired May 28 after about 40 years service.

Kline joined Consolidated Aircraft Co. in Buffalo, N.Y., in 1929 and has had continuous service for the past 39 years.

He was with Consolidated Aircraft at North Island in 1935, providing service for company-built seaplanes when construction began on the first plant building at Lindbergh Field.

He later ran the old Consolidated flight line and made first flights on many early aircraft including the PBX, the 31-X, the XPB-2Y1, the SB-24, and the B-24.

Kline was working overtime on the B-24 line when the Jap-



Jack Kline

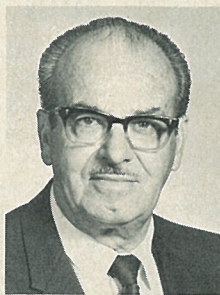
anese attacked Pearl Harbor and made his last "official" flight on a B-24 early the following year when a Japanese submarine shelled Santa Barbara.

He was transferred to the former Astronautics Division in 1956 before the Kearny Mesa plant was built to help plan shop facilities and establish equipment specifications. He later served several years as superintendent of fabrication for that division.

'Eddie' Robinson Ends Long Career

Edward D. "Eddie" Robinson, superintendent of DC-10 fuselage fabrication for Convair Aerospace-SD, retires next week after more than 35 years service.

Robinson, currently recuperating from surgery, joined Consolidated Aircraft Co. in San Diego in 1935 as a mechanic in the wing department and has



Eddie Robinson

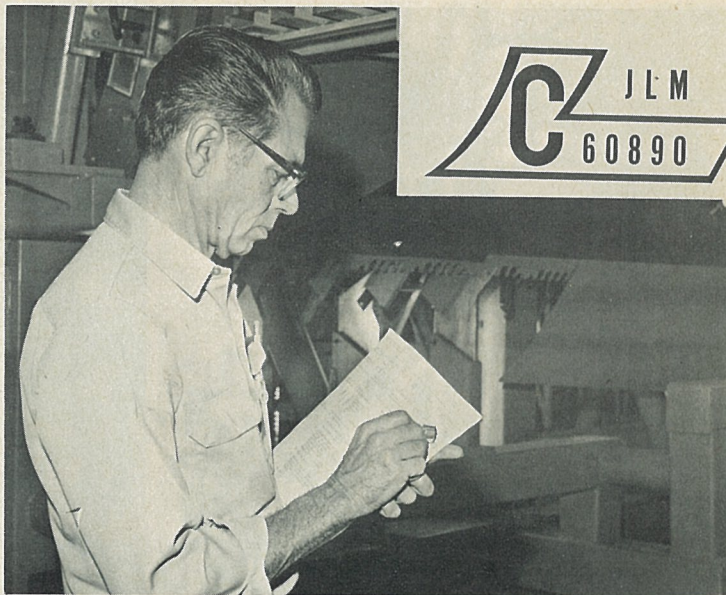
had a hand in fabrication of most of the aircraft produced by the company since then.

He was supervisor and assistant foreman for wings and related equipment for the Commodores and during World War II was general foreman and superintendent for B-24 wing and fuelage assembly at Plant 2 (now Air Force Plant 19). He later had responsibility for fabrication of wings and other components for the 110s, L-13s, T-29s, and B-36s.

Robinson was superintendent of structural assembly for the F-102 and F-106 fighter-interceptors and served as assistant factory manager for fabrication and assembly of the Convair 880 and 990 liners.

Kickbush Makes 'Big Catch' In Divers' First Outing

Cliff Kickbush took first place in CRA Delta Divers' first competition dive of the year last month by bringing in seven fish and two abalone to garner 28 points. Points were given for each specie and each pound of catch. The dive left Roy Rogel's team in first place by two points in team standings.



INDIVIDUALIZED — J. L. Martin, Dept. 046 surface and structures assembler, uses employee personal stamp on operations planning card to indicate work he has completed on DC-10 door track. Replica of Martin's stamp is in inset. Approximately 4,500 Convair Aerospace-SD employees use such stamps.

4,500 Now Carry 'Personal Stamps' to Mark Each Part They Produce With Own 'Signature'

About 4,500 Convair Aerospace-SD factory personnel now are using employee "personal stamps" (EPSs) regularly to identify production work they perform as Convair craftsmen.

Each individual stamp, less than 1/2-inch wide, is in the form of a check mark and contains the letter "C" for Convair and the employee's initials and clock number. Ink is contained in each stamp unit.

Bob Daly, factory manager, said the stamps help increase individual responsibility and pride in workmanship.

"Paperwork" accompanying material on which the individual works is stamped for each task as it is completed and prior to inspection.

"It's a matter of pride and recognition," commented Harry Rote, superintendent of DC-10 assembly. "When a man stamps off a job he has completed, he is saying, in effect, 'I did this job and I'm proud of it.'"

Bob Franklin, machine shop foreman at Kearny Mesa, said he believes use of the stamps cause the individual to "think more about the need for quality work" as well as helping supervisors keep tab on when a job has been accomplished and by whom.

Employees interviewed on the job agreed that use of the personal stamps is a "good idea," too.

"I always do my best," said C. P. McVay, a DC-10 assembler and 32-year Convair veteran. "The stamp just proves I've been there. It reminds me, in a way, of when we put our signatures on parts we made for B-24s during World War II."

R. F. Haight and Charles Bates, also DC-10 assemblers, say the stamps help supervisors to know who's doing good work.

"And if I ever do a poor job or make an error, I want someone to tell me," Bates said.

Winston Strunk, a jig-bore

machinist at Kearny Mesa, figures the stamps cause people to be more careful since they connect the workman to the task performed. He carries his stamp on the same key ring with his tool checks.

Wilbur Hand, a milling machinist at Kearny Mesa and 25-year veteran with the division, says the stamps save time for supervisors "who don't have time to watch every part come off every machine."

Hand and another employee in the same department have the same initials so see the benefit of having the individual's clock number included.

Issuance of personal stamps to hourly employees in 23 functions was completed in September. New employees receive their EPSs at the time they pick up their badges.

L. I. Medlock, director of reliability control, said institution of the EPS program was one of several actions taken last year to help instill personal pride in "doing the job right the first time."

Brady to Assume Space Shuttle Post

James F. "Jim" Brady Jr. has returned to Convair Aerospace Division's San Diego operation, after 4½ years with General Electric, as director of program development for Space Shuttle.

He reports to Dr. Donald Dooley, vice president and Space Shuttle program director, and will be responsible for managing preparation of the Phase C/D Space Shuttle proposal.

Brady had been with Convair 16 years before joining G.E. in 1966.

At Convair, Brady was program manager of various advanced study and hardware programs such as nuclear power aircraft, high-altitude supersonic reconnaissance aircraft, lifting-body re-entry vehicles, advanced reusable boosters, and Apollo application. He also served as engineering staff to the vice president of research and engineering in 1966.



AMERICA
NEEDS
YOUR
HELP

BUY
U.S.
SAVINGS
BONDS

Cancer Cell Project Earns Navy, AF Trips

Randy Dorian, a Madison High School senior and son of Mark Dorian of Convair Aerospace-SD's Dept. 596-0, won three additional awards for his Science Fair project on cancer cells in a frog at the recent International Science and Engineering Fair in Kansas City, Mo.

They were the American Dental Association award, the U.S. Navy cruiser award (that includes a week's visit to a Navy facility) and the U.S. Air Force plaque that includes an expense-paid trip to an Air Force research facility.

Thirty-two children of Convair Aerospace-SD and Electro Dynamic-SD employees had entries in the local Science Fair, 19 of which won a total of 27 awards.

Log Entries

Service Emblems ELECTRO DYNAMIC

Service emblems due during the month of June.

Thirty-Five-Year: Dept. 444, Thomas G. Eckles.

Thirty-Year: Dept. 444, W. U. Gatterman.

Twenty-Five-Year: Dept. 445, G. L. Jones; Dept. 448, D. J. Campbell.

Twenty-Year: Dept. 422, W. J. Squance; 423, C. M. Williams; 426, R. L. Sumpter; 526, Evelyn Standridge; 565, H. L. Bain; J. E. Critchett; 614, J. A. Tucker; 716, E. R. Morris.

Fifteen-Year: Dept. 116, H. M. Williams; 391, E. Smith; 422, L. Huntsman; 426, C. E. Brown; J. L. McIntosh; 441, S. A. Combs; 444, W. E. Marchant; Elizabeth Day Miller; 447, J. C. Harrold; D. L. Kell; S. Poulakidas; J. M. Robertson; 449, E. Medina; 523, Lorraine Rubida; 526, P. R. Clavert; V. E. Klundt; 566, M. E. Kruger; 612, J. A. Moody; 616, D. B. Carson; 637, W. W. Blanchard; C. J. Mann; 638, J. W. Frost; 716, E. Swindell; 923, D. G. Longbottom.

Ten-Year: Dept. 423, H. F. Fitzgerald; 424, Myrtle Lou Miller; 426, D. M. Janssen; 447, E. T. Richards; 449, I. M. Wooden; 526, A. M. Firebaugh III; 527, C. W. Scott; 614, D. C. Clark; 619, R. L. Brening; 638, F. J. Heath; R. P. Raligorski; W. K. White; 716, R. A. Sievers; 922, U. Burk.





CHANGING HANDS — Charles B. Simmons, left, new president of Convair Management Association, receives banner from retiring president Herb Day. New association officers will be installed at annual awards dinner in the Atlantis Restaurant.

New Printed Wiring Board Facility Called 'Most Advanced' in Country

Stromberg-Carlson is now operating what is probably the most advanced printed wiring board fabrication facility in the United States. More than \$300,000 has been invested in the facility whose capacity is eight to ten times as great as previous operations.

With increasing sales of the company's electronic systems, demand for printed wiring boards has increased markedly. A single CROSSREED central office switching system cabinet, as an example, contains between 250 and 1,000 printed wiring boards. A complete 1,000 line system may contain 15,000 or 20,000 of the boards.

The new 10,000 square foot facility houses two electronically controlled plating lines which can turn out thousands of printed wiring boards a day. Demand for these components had made it necessary to subcontract some of the fabrication work to outside firms.

AEROSPACE SON WINS SCHOLARSHIP

Tony Haulk, a Mission Bay High School junior and son of Verna Haulk of Convair Aerospace-SD's Dept. 518-0, has been awarded a National Science Foundation scholarship to study forest science this summer at the University of Washington in Seattle.

RUNNERS COMPETE IN 26-MILE EVENT

Two runners from CRA Health Club were among 700 competitors in the 26-mile 385-yard 5th annual Palos Verdes Marathon last month. Gary Clark completed the course in 3 hrs. 49 min. 54 sec. and Bill Dawsey in 5 hrs. 2 min. Only 360 finished.



According to Russ Garrison, General Foreman, the tables now are turned. "We are now capable of producing more than we can use," he said, "so we are planning to accept work from other companies that need high quality printed wiring boards." The excess capacity is a "cushion" built into the facility to ensure that it will be able to meet future needs.

What makes the facility unique is the combining of a new copper reduction process with automatic operation. The "CP-70" process itself is relatively new and the S-C operation is believed to be the only automatic CP-70 line in existence.

The new process is an improved method of applying copper plating through holes drilled in the non-metallic boards. Such plating through holes is necessary to connect circuits on one side of the board to the other.

In addition to the copper reduction and etch line, another and larger automatic process line applies copper and solder plating to the etched boards.

The sophisticated production equipment represents an investment of more than \$250,000 and an additional \$65,000 was spent to modify the building to accommodate the new operation. A new chemical resistant floor, new water and air lines and a steam heater to supply tempered water to process baths were included in the building modification program. New blowers were also installed to provide large quantities of fresh air to the facility.

Four large air scrubbers are an integral part of the system and ensure that only clean air will be released outside the plant. These scrubbers wash 50,000 cubic feet of air each minute to remove traces of chemicals drawn off the process solutions.

Consistent high quality is ensured too by the system's precise control equipment. Timing and sequencing of process steps is exacting and the control systems virtually guarantee uniform quality for all printed wiring boards.

A big plus is the gain in production output that will help keep costs competitive and will enable Stromberg-Carlson to control all of its own printed wiring board production. The Rochester facility will supply these boards to all S-C plants.

U.S. Bond Buying Hits 90 Per Cent

Ninety per cent of Convair Aerospace-SD's and Electro Dynamic-SD's employees now are buying U.S. Savings Bonds through the Payroll Savings Plan as a result of last month's 10-day campaign.

This represents an increase of 14 and 22 per cent, respectively, in the number of Convair Aerospace-SD and Electro Dynamic-SD personnel who are buying bonds regularly through payroll deductions.

M. C. Curtis, vice president and general manager of Convair Aerospace-SD, and W. E. Bratton, vice president and general manager of Electro Dynamic-SD, said they were pleased with results.

"This indicates splendid spirit on the part of most of our people in helping our country while helping themselves through systematic saving for Savings Bonds," they said.

Curtis and Bratton also commended departmental coordinators for "an excellent job" in acquainting others in their departments with benefits of the Savings Bonds program.

Preliminary returns last week, with some sign-up cards still to be returned, showed the following employee participation — listed by staff member, area, and percentage:

CONVAIR AEROSPACE-SD

D. A. Dooley (space shuttle)	100
C. W. Blakey (contracts and pricing)	100
H. Cushman Dow (legal)	100
J. B. Hurt (DC-10 program office)	100
L. I. Medlock (quality assurance)	98
M. V. Wisdom (industrial relations)	97
K. E. Newton (launch vehicle progs.)	97
East Test Range	96
J. D. Milling (controller)	96
E. J. Hopley (sales)	95
H. E. Moose (material)	95
R. H. Widmer (engineering)	92
Vandenberg AFB	90
J. M. Adamson (operations)	87

ELECTRO DYNAMIC-SD

D. C. Prim (sales)	100
B. A. Kulchin (industrial relations)	100
R. F. Reese (engineering)	92
W. T. Dorrance (special programs)	92
F. J. Hickey (administration)	91
R. H. Nicholson (quality assurance)	90
C. H. Wychgram (controller)	90
T. C. Courington (contracts and pricing)	90
G. G. Prentice (operations)	87

Susan Okamoto Wins Wives Club Grant

Susan Okamoto, a senior at Morse High School and daughter of Satoshi Okamoto, a profile machinist in Convair Aerospace-SD's Dept. 015-0, has been awarded the Convair Wives' Club's \$250 scholarship to assist with her studies next year at the University of California at San Diego.

Miss Okamoto, queen and head songleader at Morse this year, has a 3.46 grade point average.

She was on the varsity girls gymnastic team, and placed fifth in a city-wide cheerleading competition. She enjoys swimming, reading, and solving mathematical puzzles and problems in her spare time.

Con-Trib-Club Grants \$10,200 To Three Service Organizations

Convair Employees' Con-Trib-Club committee awarded grants totaling \$10,200 to three community service organizations in its May 13 meeting.

Included was \$8,000 for the Community Campership Council of the United Community Services organization, \$1,200 to be granted in \$300 increments to Children in Need, Inc., and \$1,000 to the San Diego County chapter of the National Safety Council.



HS GRADS — Convair Aerospace-SD employees completing requirements for high school diplomas through in-plant courses are, clockwise from left: Instructor Heidy St. John, J. Paul Herring, Charles Mitzel, Chuck Abernathy, Bob Gearhart, Joe Rizzo, Don Griffiths, Linda Gower, Hilario Banda, James Warren and Simon Payne. (Not pictured was Roger Pawluk.) They will receive diplomas from Midway Adult School. Second series of in-plant classes offered by educational services will begin June 21.

CRA Calendar

(For information on CRA activities, call CRA headquarters, ext. 1111 KM. Deadline for next issue of GD/WORLD is June 15. Call ext. 1071 LF or 3322 KM. All meetings are held in CRA Clubhouse unless otherwise noted.)

★ ★ ★
ADVENTURERS — Meet 7:30 p.m., June 16.

ARCHERY — Practice shoot, 10 a.m.-noon, June 12, Missile Park Archery Range. Call Al Phipps, ext. 2656 LF for information.

BADMINTON — Call Al Van Norman, 222-4867, for information.

Bicycle Club — Rides scheduled June 12 & 26. Call Bob Williams, ext. 1626 KM, for information.

BRIDGE — Duplicate bridge sessions, 7:30 p.m., each Friday.

CAMERA CLUB — Meet 7:30 p.m., June 20, Photo Arts Bldg., Balboa Park.

CERAMICS — Meet 9 a.m.-noon and 7-10 p.m., Tuesdays and Thursdays.

CHORUS — Rehearsals 7:30 p.m., each Monday.

COUNTRY & WESTERN MUSIC — Meet 7:30 p.m., Thursdays, CRA Missile Park picnic shelter.

DELTA DIVERS — Meet 7:30 p.m., tonight, (June 9).

FENCING — Workouts and instruction 7:30-10:30 p.m., Fridays, YWCA, 10th & C Sts.

FISHING CLUB — Potluck 6:30 p.m., meeting 7:30, June 15, Gillespie Field Clubhouse.

GOLF — Coronado tourney, June 12-13, 6:30 a.m. tee-off.

HEALTH CLUB — Open 9:30 a.m.-10 p.m., Monday through Thursday; 9:30 a.m.-9 p.m., Fridays; 9 a.m.-noon, Saturdays; "women only" weekdays, 9:30-11 a.m.

ICE SKATING — GD family skate night 6:15-7:45 p.m. each Thursday, House of Ice, Interstate 8 and Lake Murray Blvd. Flat rate fee \$1 (includes skates).

JUNIOR SCIENCE — Meeting 7:30 p.m., June 18.

MINIATURE RAILROAD — Operating sessions Saturdays, Sundays, and holidays, CRA Missile Park.

MODEL HO RAILROAD — Work sessions 7 p.m. each Tuesday.

PISTOL CLUB — Shoot 9:15 a.m., June 12, Police Pistol Range, Federal Blvd. & Home Ave.

RADIO CLUB — Meeting 7:30 p.m., June 17.

RIDING CLUB — Meeting 7:30 p.m., tonight (June 9).

RIDING CLUB — All-western horse show, June 20. Pincrest campout, July 9-10.

RIFLE CLUB — Senior shoot 7 p.m., June 9. Junior shoot 9 a.m., June 19. Gillespie Field Range.

SCULPTURE — Workshop sessions 7:30 p.m. each Monday.

SKI CLUB — Water skiing each Wednesday, 5 p.m., Crown Point landing.

SPORTS CAR CLUB — Meeting 7:30 p.m., tonight (June 9).

SQUARE DANCE — Dance 8-10 p.m., each Thursday.

STAMP CLUB — Meeting 7:30 p.m., June 10.

SWIMMING — Family swim night 7-9 p.m., June 19, Mission Beach Plunge. Tickets at employee benefits, 5 cents.

TENNIS — Tournaments in progress, Mesa College courts. Call Bob Herold, ext. 2658 LF for information.

TOASTMASTERS — Convair Toastmasters meet 4:30 p.m. each Wednesday. Dynamic Toastmasters meet 5:30 p.m. Thursdays.

WIVES CLUB — Membership potluck luncheon, June 23. Call Lorraine Hudson, 282-4774 for reservations.

WOMEN'S GOLF — Mission Bay tourney, June 12, 8 a.m. tee-off.

'Batter Up' Time For Game Clarified

Tickets went on sale this week for the Convair Management Association and Convair Recreation outing to a doubleheader baseball game between the San Diego Padres and Chicago Cubs at San Diego stadium July 9.

Paul Green, coordinator of the event for the launch vehicle programs department, said the early game will begin at 6 p.m. — although tickets being distributed show a 7:30 time.

"When the tickets were printed, this was to be one game but it was subsequently rescheduled to a doubleheader starting at 6," he said. "We are concerned that some will forget the early starting time."

Cost is \$1.50 for loge section seats (a \$1 saving) and \$2 for plaza section seats (a \$1.50 saving). Tickets are available through all CRA outlets, Barbara Freeman at the Bldg. 5 vendor lobby at Lindbergh Field, and Colleen Woodrum in Bldg. 26 at Kearny Mesa.

A free drawing for a \$500 vacation trip will be conducted between games for those who have purchased tickets through the in-plant outlets.

The event will be open to all General Dynamics employees and guests. K. E. Newton, director of launch vehicle programs, will be executive sponsor.

Pistol Club Marksmen Bring Back 15 Trophies

CRA Pistol Club teams and members took first places and brought home 15 trophies from the San Diego Industrial Recreation Council's 18th annual "Industrial Gun Shoot" May 23 at the Camp Elliott range.

CRA teams placed first and third in .22 caliber police, scoring 1,135 points. Convair's first team was composed of Red Schneider, Jim Halfacre, Charles Kropp, and Harry Black.

In center-fire, CRA team No. 1 placed first with 1,036 points. Firing for CRA were Kropp, Schneider, Black, and Jerry Lehrer.

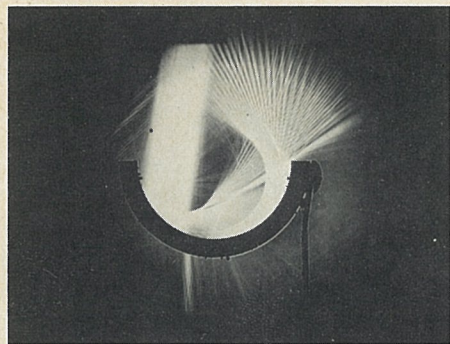
Yugoslavian Hams Still Offered By CRA

Lean Yugoslavian 10 lb. 8 oz. canned hams are still available — by the can or the case — through Convair Recreation Association.

Cost is \$10 each and purchases may be made weekdays at the CRA Clubhouse and weekends at Missile Park.

George Schmiedel, supervisor of recreation, said more than 600 of the pork shoulder picnic hams have already been sold through CRA under a special arrangement with Douglas Aircraft Co.

The hams were included in a \$9 million international bartering arrangement that included sale of two Douglas jetliners. Sales have been extended to General Dynamics people in San Diego because of Convair Aerospace-SD's work on DC-10 fuselages.



SOUND PICTURE—Scientists use schlieren system to photograph ultrasonic sound beam striking curved pieces of aluminum.

Ocean Platform Hulls To Be Built At Biloxi Plant

Electro Dynamic Division has awarded a \$655,238 subcontract to Daco Industries of El Cajon, Calif., to fabricate and assemble hulls and superstructures for six Ocean Platform System (OPS) environmental data buoys at its marine fabricating plant in Biloxi, Miss.

Each of the OPS buoys will be instrumented with more than 100 environmental sensors and will be used in the Gulf of Mexico by the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce in the National Data Buoy Program to provide routine weather reporting and faster, more accurate hurricane warnings for the Gulf Coast.

Roy V. Woodle, Electro Dynamic-SD program manager for national data buoy systems, said Daco Industries will fabricate each of the 40-foot-diameter steel buoy hulls in four sections, then weld the sections together at its Biloxi plant.

The six disc-shaped hulls will be delivered between September and December. The subcontract also calls for Daco to install and check-out Electro Dynamic-furnished equipment for the buoys.

Contract negotiations for Electro Dynamic-SD were handled by Mel Kruger, purchasing agent, and Bob Patterson, technical buyer.

Electro Dynamic holds a NOAA contract for \$5,553,946 for design, production, systems integration, and support services for the data buoy program.

Westinghouse Electric Co.'s Ocean Research and Engineering Center in Annapolis, Md., also holds a NOAA contract for about \$5.5 million for development and production of the oceanographic and meteorological sensors to be used.

SOUND BEAMS VIEWED WITH NAKED EYE IN TRANSDUCER TESTING

Ultrasonic sound beams emitted by transducers in delta-scan inspection devices can be viewed by the human eye, thanks to a schlieren optical system assembled at Fort Worth operation.

Transducers are devices used to convert electrical energy into sound. The transducers used in delta-scan inspection send a beam of ultrasound into the metal part being tested. Flaws show up as changes in the emerging signal pattern.

"If the transducer doesn't work properly," said Dr. Nat Godbold, reliability/quality research specialist, "we might not detect a flaw that could eventually cause the part to fail."

"Up to this point, we've had to use long, involved techniques to test transducers. The schlieren system, though complicated, does give us a quick and reliable check."

In the new technique, a transducer emits an ultrasonic beam through a container of water. The beam, normally invisible, alters the water sufficiently that rays of light, passing through the tank at right angles to the sound beam, make the sound beam visible on a ground glass screen.

Technicians, viewing the action through the screen, can literally see the profile of the beam. They compare it with a known "good profile" and know immediately if the transducer is operating properly.

Television cameras monitor the test, projecting results on a nearby television screen.

"The system has worked quite successfully," Dr. Godbold said. "Still, we hope to evolve an even simpler way to check in the near future."

Dr. Godbold pointed out that ultrasonic sounds, such as those emitted by a delta-scan device, range from one to 25 million hertz (vibrations a second). The human ear can hear sound only up to about 20,000 hertz.

"The schlieren system itself is not new," Dr. Godbold said. "However, we designed and assembled our own system at Fort Worth in a joint effort between Dept. 230 (manufacturing research and development) and Dept. 273 (process control). It is one of the systems being used in an Independent Research and Development (IRAD) program conducted in the NDT Research and Development Laboratory."

Transducer units which are tested and found to be operating properly are returned to service. Defective units are returned to the manufacturer for rebuilding at half the cost of a new unit.



QUICK PICTURE—Carol Erfe, material staging control, operates one of 29 cathode-ray terminals located throughout planning and material areas at Electric Boat Division and connected to planning and control computer for instant retrieval and input of up-to-the-moment data.

Airlines' Seat-Reservation Tool Adapted to EB Inventory Control

The computerized cathode-ray terminal (CRT), long familiar as the airlines' seat-reservation tool, is making material control more effective at Electric Boat Division, through the division's IMPACT (Integrated Material Processing and Control) program.

Says material management manager Walter B. Thompson, IMPACT is:

- Cutting down computer printout reports;
- Reducing inventory requirements, duplication and over-ordering;
- Eliminating files and binders;
- Relating material acquisition, storage and dispatch to "real-time" (as-of-the-moment) inventory and production data.

Here is how IMPACT works: Standing data on material and production (such as inventory balances, work authorizations, manufacturing sched-

ules) are centrally stored in a computer, ready for instant retrieval. (Formerly they were in scattered files and binders, time-consuming to search and subject to damage, smudging, loss, delay and misfiling.)

The data shift constantly with inventory additions or withdrawals, work authorization changes and alterations to schedules. As fast as they originate, these changes are input to the computer from 29 CRT's spotted throughout material and planning areas.

To consult the data, it is necessary only to query the computer through a CRT to obtain real-time information.

"This way," Thompson says, "material doesn't get ordered or fabricated against a work authorization that was cancelled the week before. And make-or-buy decisions can be based on real-time schedule and work-load factors as well as cost."

"Accurate forecasts permit hardware to be ordered only as far ahead as actually needed, then assembled against specific work authorizations and stored in a secure place until required. This cuts down the loss, damage and hoarding which have upset schedules in the past."

"One real achievement we've made is in requisition hold-ups, which have practically disappeared. Also, by knowing what's coming up we can save a lot of manual work by pre-printing requisitions."

Written records of computer data can be obtained from several of the CRTs equipped with printers. The operator presses a button and the printer types out whatever shows on the CRT display tube at the time.

More F-111Es Delivered To 20th TFW During May

Eight more F-111Es were delivered to the 20th Tactical Fighter Wing in Upper Heyford, England, in May.

The aircraft were assigned to the unit's 55th Tactical Fighter Squadron, which now has a total of 12 aircraft. An additional 12 F-111Es are scheduled to be ferried to the 55th by July, giving the 20th TFW a full complement of aircraft.

The two other squadrons—the 77th and 79th—were filled with F-111Es earlier this year.

Two GD Engineers Elected To Testing Society Board

Two Convair Aerospace division employees have been elected to the board of directors of the American Society for Nondestructive Testing.

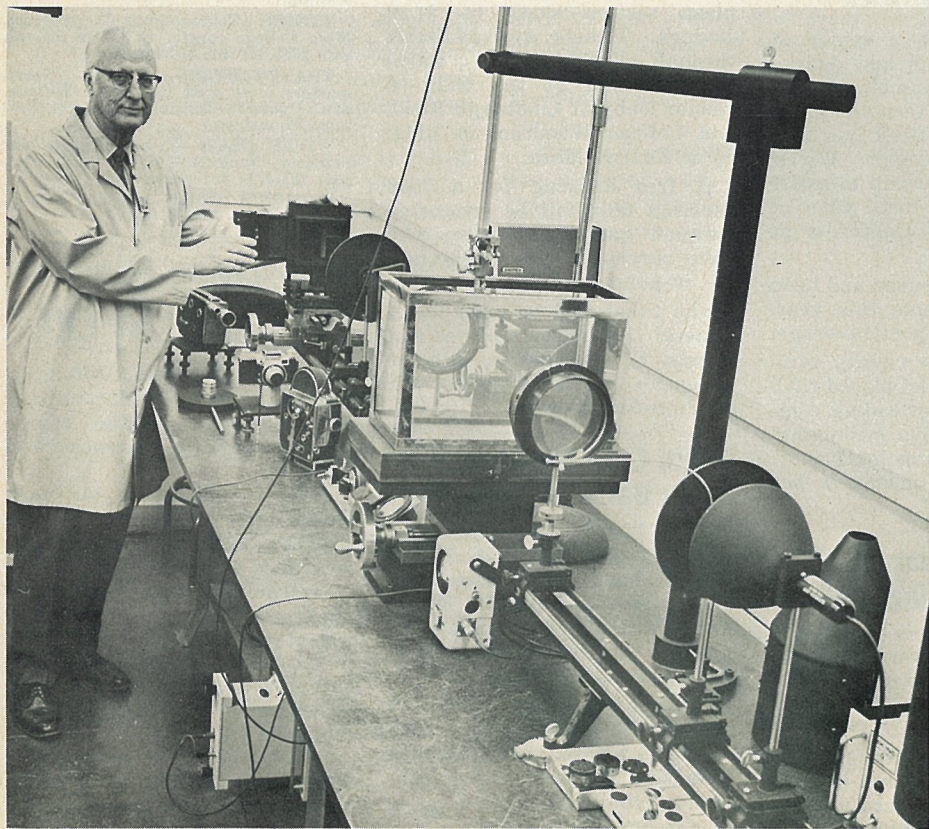
They are Donald G. Cosgrove, senior nondestructive testing research engineer at Fort Worth operation, and Robert T. Anderson, senior research engineer at San Diego operation.

More Funds OK'd by Navy To Build Standard ARM

Pomona operation of Electro Dynamic Division last month received approval of \$4,485,000 in added funding on an existing contract for Standard ARM (anti-radiation missile). Announcement was made in Washington by the U.S. Navy.

Funding is for additional missiles and avionics kits for modifying aircraft for the U.S. Air Force.

Standard ARM has been in production at Pomona for the last four years. The missile is an air-to-ground version of the Navy's ship-to-air Standard Missile and homes on radiation emitted by ground radar.



SEEING SOUND—Dr. Nat Godbold, research specialist, uses schlieren optical system to test transducers used in delta-scan inspection. Apparatus, which was assembled at Fort Worth operation, enables scientists to actually see ultrasonic sound beams.



PEEKABOO—M. F. Nicodemus, Convair Aerospace, checks row of DC-10 floor beams which stand in rack, ready to be lifted to adjacent fuselage line at San Diego.

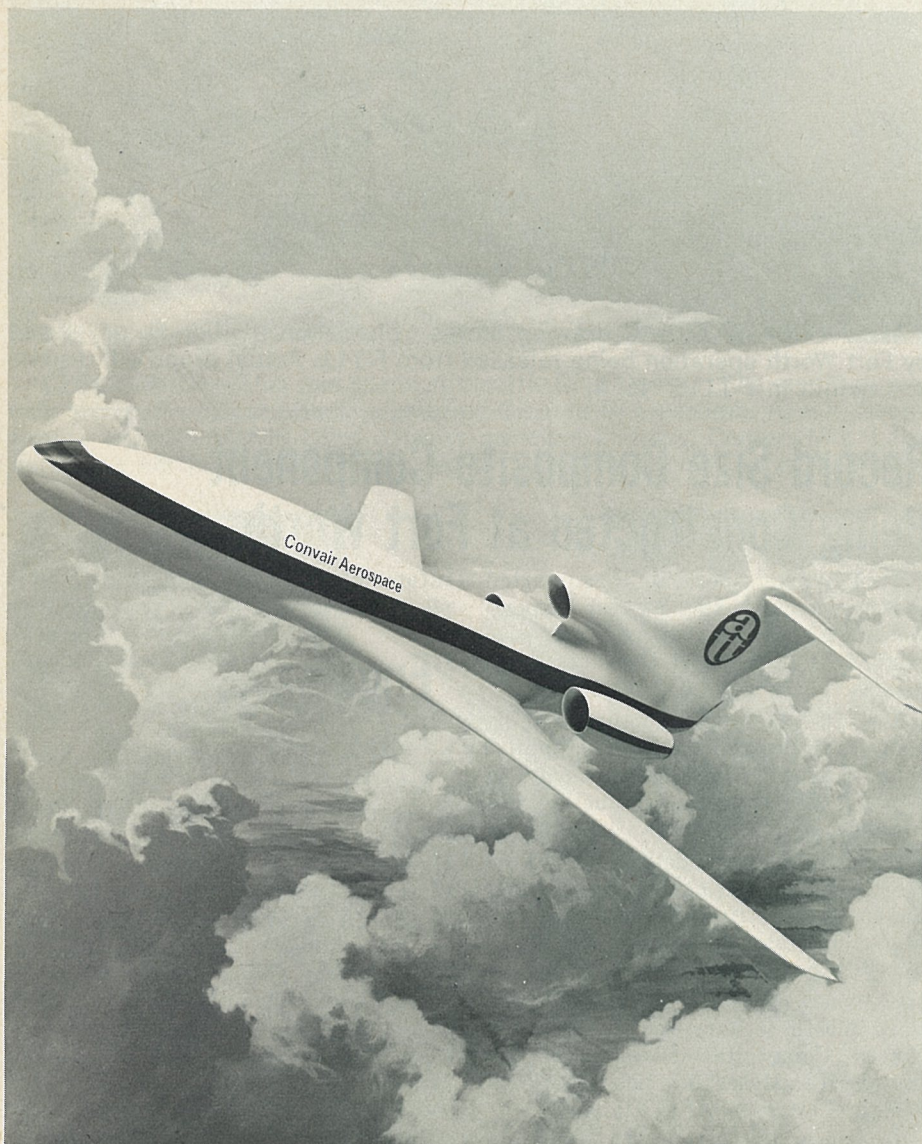
General Dynamics World

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PUBLISHED BY GENERAL DYNAMICS CORPORATION

★ ★

June 23, 1971



SLEEK — New type of wing is illustrated in this model of futuristic transport aircraft.

Designs For Air Transports Of 1975-1985 Explored

Jet transports of 1975-85 will be faster, quieter and more comfortable than today's airliners, and they'll emit fewer pollutants.

The futuristic aircraft will be roughly 20 per cent lighter than today's transport, and it will be cheaper to build and operate, thanks to new plastic-like composite materials.

"These are some of the qualities we plan to design into the future transport, based on current and projected advances in the art," said Ken Carline, manager of the Advanced Transport Technology program at Fort Worth operation.

Fort Worth is working on a \$1 million contract from National Aeronautics and Space Administration's Langley Research Center to study the 1975-85 transport technology. In addition, Fort Worth has a \$400,000 contract to wind-tunnel test various new aircraft shapes in support of these studies.

Tomorrow's transport will probably cruise at 660 miles an hour, just under the speed of sound at 40,000 feet. That's about 100 miles an hour faster

than the cruise speed of today's long-range jets.

"On the average," Carline said, "this would reduce the time for a trans-Atlantic flight from seven to six hours."

The future transport will get its additional speed from a new "supercritical" design, which in effect reverses the shape of today's airfoil. Instead of being curved on top and flat on bottom, the supercritical wing will be relatively flat on top and curved on bottom.

"This new design will permit aircraft to travel efficiently in the transonic realm — say between Mach .9 and 1.0 — for the first time," Carline said. "The plane could travel farther on less fuel — or carry a bigger payload with the same fuel."

A pinched-waist fuselage, similar to the one Fort Worth used on the Mach 2 B-58 Hustler, will further enhance the advanced transport's transonic performance.

Wings, tail surfaces, and perhaps the fuselage of the advanced transport will probably be made of graphite epoxy composite, a material that is much lighter than aluminum, yet as strong.

The composite is made by stripping layers of the material together into any desired shape. This enables engineers to design a component so that it will be strongest at the point where it will take greatest loads.

"By using composites," Carline said, "we can 'mold' large sections of the aircraft in much the same way that you would make a plastic boat. Parts would be made from the outside shell inwards, rather than the present way of riveting a skin on the outside of a skeleton of frames and stringers."

"This advancement could reduce the airplane's weight by as much as 20

(Continued on Page 2)

U.S. Defense Rests on Control of Seas, Navy Secretary Says at Launching

Two landmark events in the nation's submarine history, the launching of the Navy's 100th nuclear submarine Silversides, and the keel-laying for the advanced turbine-electric-drive Glenard P. Lipscomb, took place June 4 and 5 at Electric Boat Division.

At the Silversides launching, Secretary of the Navy John H. Chafee explained why "the facts of life for the United States" required an expanding Navy and submarine force. Calling the U.S. "for all practical purposes an island nation (whose) defense depends on control of the seas," he declared "that control is being challenged as it has not been in this century" by the more than 350 submarines of the Soviet Union, including 92 nuclear-powered.

"This is three times the U.S. force," the Secretary said. "About 50 are capable of launching ballistic missiles. Another 65 carry shorter range cruise

missiles for use against ships. All are of post-World War II construction which is not the case with our submarines."

(Continued on Page 3)

'New' England Will Return to Duty June 26

USS England (DLG-22), a guided missile frigate, will be recommissioned at the Bath Iron Works, Bath, Maine, Saturday, June 26. England is the tenth in a series of Terrier-armed ships to undergo fleet modernization.

RAdm. John N. Shaffer, Commander, Cruisers and Destroyers, Atlantic, will be the principal speaker at the commissioning ceremonies.

Capt. J. J. Paulis Jr., is commanding officer of England. Other officers include Cdr. E. A. Hamilton, executive officer; LCdr. J. H. Freeman, weapons officer, and LCdr. C. F. Homan, operations officer.

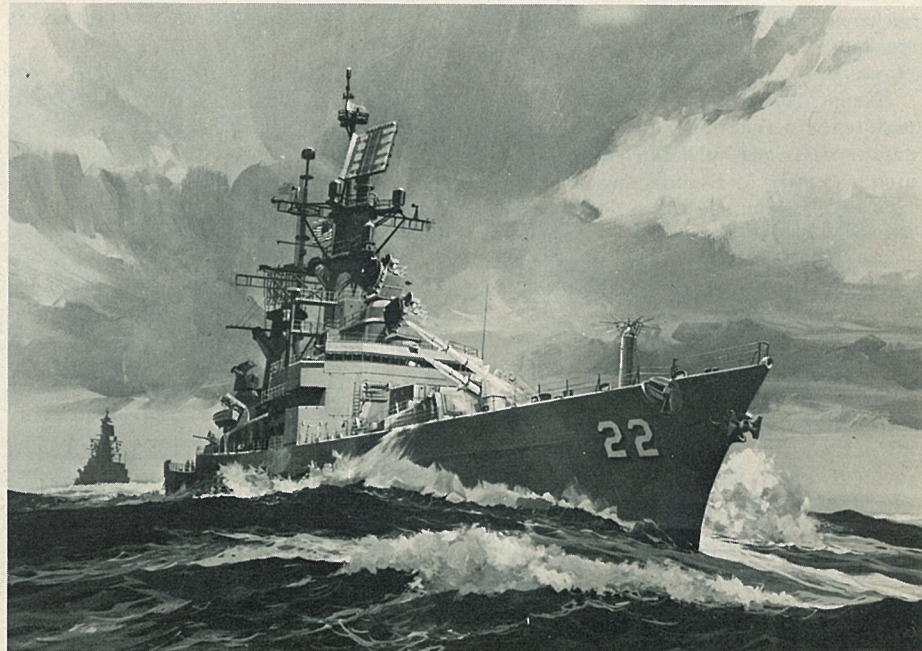
General Dynamics will be represented at the England recommissioning ceremonies by W. J. Morrow, a vice president of Electro Dynamic Division and general manager of the Pomona (Calif.) operation; C. D. Perrine, ED vice president; Dr. L. F. Buchanan, vice president research and engineering at Pomona; C. L. McCabe, director of logistics support and ship systems programs at Pomona.

Pomona operation of Electro Dynamic has been directly involved in the Navy's DLG modernization program since its inception in 1966 as the specialized systems test contractor.

C. T. Pearson is project manager of the DLG modernization program for Pomona operation and R. J. Robertson has been the training representative in the Bath area. A. R. Pendergraft is senior General Dynamics representative at Bath Iron Works. I. J. Schab and D. L. Heffron have been assigned to USS England for Phase III of the modernization cycle which follows recommissioning.

Earlier ships in the program have included USS Leahy, Harry E. Yarnell, USS Gridley, USS Farragut, USS Preble, USS Reeves and USS Worden, all of which have completed Phase III. USS Dewey started Phase III April

(Continued on Page 2)



RECOMMISSIONED — USS England (DLG-22) will be recommissioned this Saturday (June 26) at Bath, Maine. England is tenth in 20-ship modernization program. Ed Ramstead of Pomona operation was artist.

Gorden MacDonald Named To Board of Directors

Gorden E. MacDonald, vice president, finance, of General Dynamics has been elected to the company's Board of Directors, David S. Lewis, Chairman and Chief Executive Officer, has announced.

MacDonald joined General Dynamics in April this year after having served for some years as vice president and chief financial officer of Hughes Aircraft Company, Culver City, Calif. He is a member of the Financial Executive Institute, the National Association of Accountants and the American Institute of Banking, as well as many other professional societies. In addition to his financial background, he holds a law degree.



SPECIAL DELIVERY—B. F. Ferguson, left, Convair Aerospace-SD F-102/F-106 deputy program manager, greets Lt. Col. Andrew Bostock of Vermont Air National Guard on his arrival with Convair-built F-102A to be used in aircraft structural integrity program. At right are Howard Auten and Ed Emerson, both engineering test pilots.

Fatigue Testing Program Begun

The first of two F-102As to be used by Convair Aerospace-SD for fatigue testing in an extensive aircraft structural integrity program (ASIP) was delivered to the Lindbergh Field plant at San Diego June 9 by Lt. Col. Andrew Bostock, commander of the 158th Fighter Group of the Vermont Air National Guard in Burlington.

B. F. Ferguson, Convair Aerospace-SD F-102 and F-106 deputy program manager, said a similar aircraft is scheduled to be received next month from the 124th Fighter Group of the Idaho Air National Guard in Boise.

The structural integrity test program is expected to enable the Air Force and Air National Guard to increase the certified "life" of F-102s and F-106s and extend their operational use as fighter-interceptor and trainer aircraft.

An F-106A, delivered previously by the Air Force, has been instrumented for a series of test flights in the program to determine stress levels on its structural members.

In the planned fatigue testing, the F-106A will be subjected to loads that would be experienced in 32,000 hours of flying time and the F-102As to loads that would be experienced in 28,000 hours of flying time.

This could result in F-106s being re-certified for 8,000 hours and F-102s for 7,000 hours of flight. Both types of aircraft are now certified for 4,000 hours of use.

F-106s are being used by Aerospace Defense Command fighter-interceptor squadrons and F-102s by Air National Guard units.

Facilities to Observe July 4th on Monday

The July 4 Independence Day observance will create another three-day weekend for General Dynamics employees.

Except for necessary security and maintenance functions, all General Dynamics divisions/subsidiaries will close Monday, July 5. Regular work schedules will be resumed the following day.

General Dynamics World

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Drop Program Conducted With New Bomb

F-111E No. 4, outfitted with a special rack to carry a new "bluff-shaped" bomb developed at Fort Worth operation, will continue a drop-test program of the weapon at Eglin AFB, Fla. this month.

The new bomb—a conventional M-117 bomb that has been re-configured to look somewhat like a cylinder—takes up roughly half the space and promises added bombing efficiency.

Armament Development and Test Center (ADTC) at Eglin AFB carried out early tests at Eglin on F-111A No. 26, which was recently retired from the test program.

"These tests showed that the bomb needed a higher level of stability to accommodate production bomb dimensional and center-of-gravity variations," said Tom Collins, Fort Worth project engineer.

Engineers then modified the aft tail cap to provide the desired stability.

"Both single and train-release drops of the modified bomb produced excellent results," Collins said.

F-111E No. 4 is slated to start its drops at Mach .95 and 2,000 feet. Later drops are to be at Mach 1.2 and 2,000 feet, and Mach 1.3 at 4,000 feet, followed by low-speed drops at high altitude.

"Eventually," Collins said, "drops will be made in the Mach 1.6 to 2.2 range."

Fort Worth manufactured 60 modification kits—plus a bomb rack—used to convert the M-117s to the new shape.

"Designs"...

(Continued from Page 1)

per cent and drastically cut fabrication and assembly costs. The part would have a smoother surface, since there'd be no rivets and fewer joints."

Composite wings, coupled with advance flight-control systems, could combine to make air travel much "smoother" for the passenger of the 1980 era.

"Sensors in the flight-control system would detect turbulence and automatically 'command' the wing to compensate by 'bending'—rolling with the punch, so to speak," Carline said.

The composite wing's greater variable-stiffness characteristics reduce the effects of loads. This improves the wing's fatigue life and enhances safety.

Carline said Fort Worth operation was working closely with engine manufacturers in producing engines that would reduce noise and at the same time cut down on pollution emission.

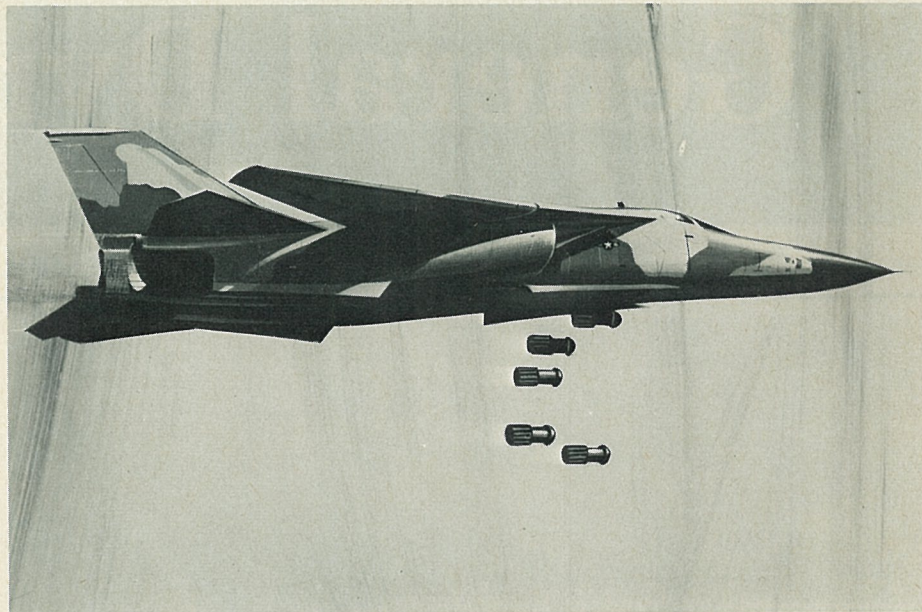
"New noise-suppression techniques are being developed which should be ready for a plane in the 1975-85 time frame," Carline said. "I think we'll ultimately be able to reduce the noise level by well over 50 per cent."

"Manufacturers are also making headway in developing engines that will burn fuel more efficiently. The result, of course, will be less pollutants emitted from the engines."

Carline said NASA, in issuing the contracts, hopes "to insure that the next generation of long range transport aircraft will be competitively superior in the world's aircraft market in terms of performance, economics, safety and comfort, while attaining acceptable levels of noise and pollutant emissions."

'Navigator Award' Received by Cadet

Cadet Nicholas Marchetti of the Air Force ROTC, University of Connecticut, won the General Dynamics Outstanding Navigator Candidate award for 1971. The award, a model of the F-111 aircraft and a certificate of accomplishment, was made to Cadet Marchetti by Leo DeLisle, Electric Boat Division nuclear welding and materials engineering, on behalf of the Corporation.



NEW LOOK — Artist's drawing shows "bluff-shaped" bombs developed by Fort Worth operation being released from F-111. Actual drops will resume this month in F-111E No. 4.

Record Size Composite Component Being Constructed at Fort Worth

Fort Worth operation has started construction of the largest experimental aircraft advanced composite component ever built: the main fuselage section of an F-5 fighter.

The 20-foot long structure will be made mainly of boron and graphite-epoxy composites and weigh about 26 per cent less than the production F-5 fuselage.

Following construction in Fort Worth's Advanced Composites Center, the fuselage section will be structurally ground-tested.

The F-5 project represents the second phase of a \$5 million contract Fort Worth is carrying out for Advanced Composites Division of the Air Force Materials Laboratory at Wright-Patterson AFB, Ohio.

In Phase I, Fort Worth built and ground-tested a 14-foot long composite part which simulated the aft fuselage of the F-111. The part was made of a variety of advanced composites, but mainly graphite-epoxy.

The composite fuselage weighed about 19 per cent less than the aluminum F-111 fuselage and was tested to 133 per cent of required loads.

"Building and testing the F-5 composite will mark a major milestone in the Air Force's plan to build and test all structural components of an aircraft," said P. D. Shockey, Dept. 064-7 project structures engineer. "The ultimate goal, of course, is to develop a complete composite airframe with high structural integrity that will weigh much less but still meet all requirements of existing airframes."

Shockey said Fort Worth has played a major role in the composites program.

Composite materials are made of fiberglass-like layers, or plies, each of which is about the thickness of three sheets of paper. Each ply contains parallel boron or graphite fibers as re-

inforcements which are coated with plastic materials.

"England"...

(Continued from Page 1)

26 and USS Luce is about to begin Phase III.

Named for Ens. John Charles England, USNR, who was killed at Pearl Harbor just four days before his 21st birthday, USS England was first commissioned in 1963 at San Pedro, and is the second ship to be named in honor of the young officer who died while serving aboard USS Oklahoma.

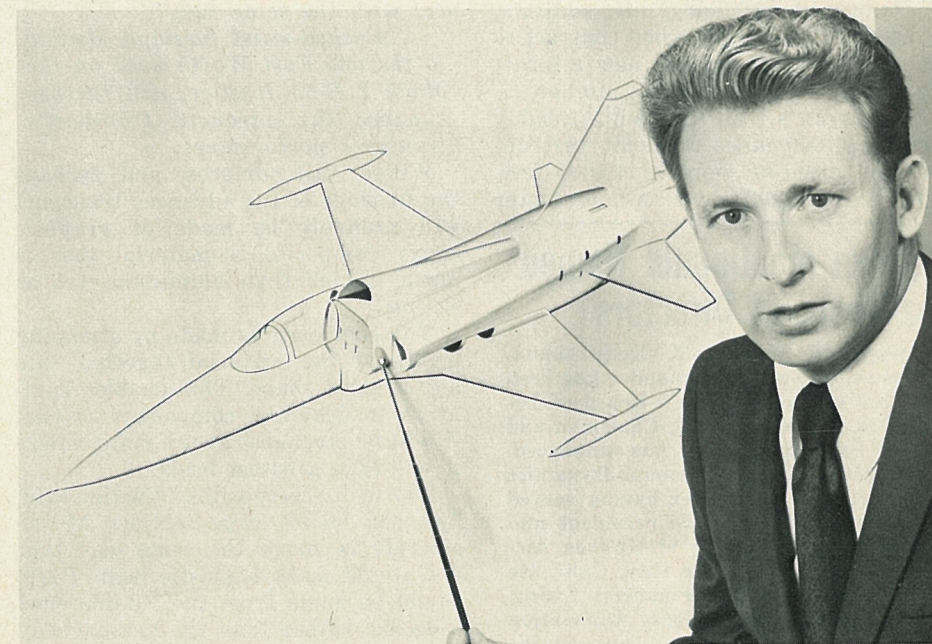
Few U.S. Navy ships have as brilliant records as the first USS England (DE-635). In antisubmarine warfare during World War II, the destroyer escort sank six enemy submarines in the last two weeks of May, 1944, for a record that no other vessel approached.

EB Proposal Approved For Water Research

A proposal by Electric Boat Division to develop methods to predict the thermal field resulting from discharge of powerplant cooling water was one of 54 research projects authorized by the Office of Water Resources Research for fiscal year 1972.

In making the announcement, Secretary of the Interior Rogers C. B. Morton said the Title II program, administered by the Office of Water Resources Research, provides for research grants to educational institutions and private foundations as well as private firms.

The \$31,000 Electric Boat proposal entitled "Free Surface Effects on a Buoyant Jet" will attempt to develop mathematical models to predict thermal effects of cooling water discharged by powerplants.



BIG JOB—Artist's drawing highlights F-5 main fuselage section, which Fort Worth operation is making of advanced composite materials. Project structures engineer is P. D. Shockey.



CEREMONIES—This was scene at Electric Boat Division this month during keel-laying of nuclear attack submarine Glenard P. Lipscomb. At left, Secretary of Defense Melvin Laird delivers principal address. Center: Mrs. Laird listens as her husband is introduced by Secretary of Navy John H. Chafee.

Right: VAdm. H. G. Rickover, Director of Naval Nuclear Propulsion, is in good humor during introduction of late Congressman Lipscomb's daughters, Mmes. Louis D. Grasso and Robert Murrell, who initialed keel of sub named for their father.



CANDIDS—Interest ranged from intense (photo at right) during launching of nuclear attack submarine Silversides at Electric Boat Division, to nonchalance (center photo) and (photo at left) to practically no interest

at all. Hundreds of Electric Boat employees and family members witnessed launching. Silversides is 100th nuclear submarine launched by U.S. and is commanded by Cdr. Robert E. Allen.

"Defense"...

(Continued from Page 1)

The United States today has a total submarine fleet of 142 vessels, including 92 nuclear-powered, of which 41 are missile-firing.

Secretary Chafee's wife, Virginia, sponsored Silversides, breaking the traditional champagne bottle on the ship's bow before the sub's slide into the Thames River. The vessel's commanding officer, Cdr. Robert E. Allen of Mamaroneck, N.Y., rode his ship into the water.

Defense Secretary Melvin R. Laird, speaking at the Lipscomb keel-laying ceremony, said "the characteristics of future submarines will be influenced by the lessons learned from the Lipscomb," which he called "a valuable test bed for a propulsion system and other technological advances."

Secretary Laird also referred to the Navy's ongoing construction of nuclear attack submarines and other craft, attributing much of the drive behind the program to the efforts of the late Congressman Glenard P. Lipscomb, for whom the new sub is named.

"For the future," he said, "we have several initiatives with regard to nuclear-powered submarines. One is the Undersea Long-Range Missile System, known as ULMS. Another is for a submarine capable of launching missiles against enemy targets while remaining far beyond the enemy's anti-submarine range." Electric Boat Division is now engaged in design and development of the ULMS submarine.

GD Will Be Represented At Pollution Meeting

Frank Paschal, bioenvironmental health center administrator at Fort Worth, will attend the 64th annual meeting of the Air Pollution Control Association in Atlantic City, N. J., June 27-July 1.

VAdm. H. G. Rickover, director of the Naval Nuclear Propulsion Program, introduced Rep. Lipscomb's widow, Virginia, and her two daughters, Mrs. Louis D. Grasso and Mrs. Robert Murrell, who welded their initials into the Lipscomb's keel, assisted by Electric Boat welders James Traylor and Dennis Corbitt, both of Groton.

Adm. Rickover called the late congressman "a valuable and dedicated legislator and one of the foremost authorities in national defense in Congress... a strong proponent of nuclear power for naval ships and a leader in support of the Navy's shipbuilding program."

David S. Lewis, Chairman and Chief Executive Officer of General Dynamics, introduced Secretaries Laird and Chafee at the two events, following welcoming remarks by Joseph D. Pierce, Vice President of General Dynamics and general manager, Electric Boat Division.

Stromberg-Carlson Offers Vast Variety of Telephones

How many different telephones would you guess are available from Stromberg-Carlson?

Chances are that even your wildest guess wouldn't come close, even if you take the four basic models, 12 different colors, desk and wall phone versions with rotary or pushbutton dialing.

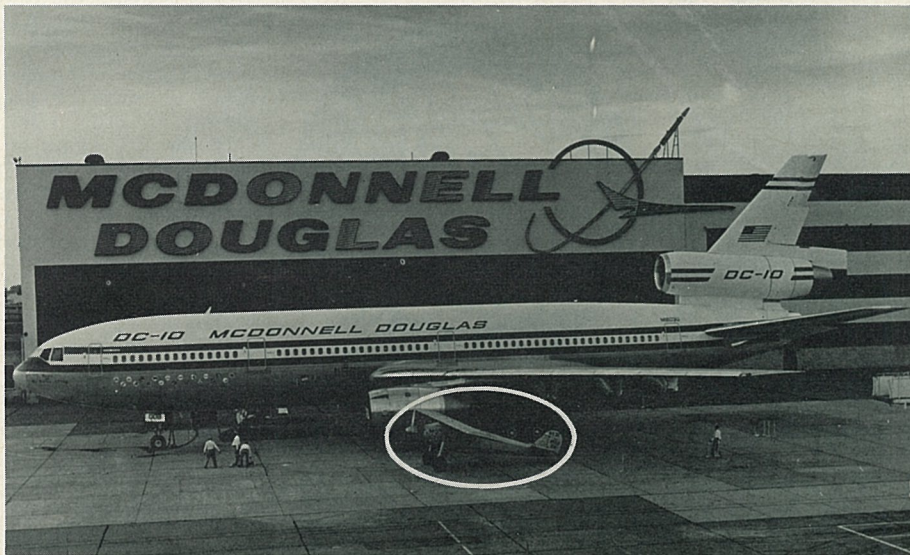
A recent study made by systems and procedures, shows that it is possible to turn out more than 55,000 different telephones without ever going to the drawing board!

This means that Stromberg-Carlson can fill the bill in any one of more than 55,000 possible situations a telephone operating company may face in providing just the right kind of telephone service to its customers.

The 1700 Series business telephones offer one example of how the possibilities add up. This telephone is available in six colors with rotary or TONE-DIAL pushbutton dialing and desk and wall models with three, five and 11 lines each. They can be equipped with intercom and transfer, with or without handsets and with many other features.

The standard 500+ telephone comes in a dozen different colors in desk and wall versions. They are available with several special features such as volume control handset and message waiting lamps as well as a variety of ringers.

Of the more than 55,000 possibilities, only a fraction are currently assigned part numbers and fewer yet are actively sold. But, all the combinations are available to meet the needs of customers when and if they are required.



DWARFED—McDonnell Douglas DC-10, called "Spirit of St. Louis—1971," dwarfs 28-foot replica of original "Spirit." DC-10 visited St. Louis en route to Paris Air Show.

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Log Book Entries

Service Emblems

CONVAIR

Service emblems due during the month of June:

Thirty-Five Year: Dept. 400, Leonard E. Weber; 820, William G. Kilgore Jr.

Thirty-Year: Dept. 015, W. J. Durlinger; 019, L. W. Stamper; 020, E. D. Booth; 027, A. D'Ercole; 031, S. B. Ames; 045, M. M. Lopez, R. F. Yturralde; 046, W. J. Sherman, J. L. White; 100, W. F. Chana, G. E. Putness; 141, G. R. Bailey; 144, R. J. Hendrickson; 170, J. R. Nelson; 250, J. S. Fisher, E. M. Franzel; 401, C. E. Cardo, B. J. Smigielski; 512, J. J. Arneri; 756, E. T. Guy; 761, W. L. McDougal; 964, O. C. Priest; 967, F. L. Cook; 985, S. C. Nelson.

Twenty-Five-Year: Dept. 001, L. V. Malody; 103, S. W. Kerr; 222, W. H. Green; 511, M. P. Stringfield; 512, E. H. Oldenburg; 761, M. H. Davis Jr., M. J. Gontesky.

Twenty-Year: Dept. 002, E. O. Bracamonte; 015, D. J. Gallaway, F. J. Thomson; 046, N. A. Loftin; F. J. Westfall; 131, J. J. Anzalone; 144, Dwain G. Rice; 146, D. F. Ognibene; 221, W. P. Connor; 222, C. S. Bates, G. L. Burst Jr.; 250, C. C. Beadle, D. J. Buck, A. H. Juhis; 400, P. T. Kaneyuki, T. S. Potts Jr., E. F. Robertson; 401, H. M. Black, R. A. Taylor; 407, L. M. Lindsey; 507, R. E. Attlesse, D. P. Cumming; 508, H. G. Liggett; 518, T. R. McDaniel, Barbara K. Miles; 565, Charlotte C. Adesso; 572, E. E. Keller; 583, R. E. Craig Jr.; 584, Bob F. North; 585, R. D. Horwitz; 587, W. W. Johnstone Jr.; 761, R. C. Esparza; 802, M. D. Myers Jr.; 810, Harry Anderson; 836, A. C. Silva; 840, J. A. Cleghorn; 951, L. C. Bennett Jr.; 966, H. Cherin; 989, G. D. Boyce.

Fifteen-Year: Dept. 015, R. E. Burns, R. R. Clarke; 027, D. J. Holma, H. J. LeClair; 045, N. L. Sherman; 046, R. P. Montijo, R. E. Schneider; 110, G. R. Vetter; 115, B. J. Wier; 130, E. Fox; 131, R. W. Imhof, A. A. Lewis, G. M. Rada-baugh, C. H. Saunders, H. D. Sewell; 141, L. Dassoff; 142, J. Bowers, C. W. Donahoe, R. L. Forbes, J. W. Quijada; 143, J. W. Taylor; 144, D. W. Kuhlman, C. J. Ohiser; 145, T. J. Condon, W. L. Johnston, J. N. Sharmah; 148, L. I. Gordon; 149, M. C. Dahl, H. C. French, C. E. Repine; 151, C. C. Hays, C. K. Twohey; 170, Helen P. Wauschek; 193, Marie E. Bianco; 199, E. C. Krug; 200, R. G. Daly; 203, M. F. Moseley; 212, A. J. Von Der Wische; 221, F. D. Bouldin, Jeannine Forbes, Irene D. Hofer; 222, M. L. Larsen; 223, R. Chart; 250, S. W. Ashcraft, E. Benyard, R. L. Brehl, C. W. Burnett, E. B. Chenault, R. F. Grimshaw, J. B. Jordan, S. J. Kozieiski, Mary E. Laffoon, V. G. Schroeder, A. E. Strawser; 400, W. W. Davies Jr., Rose Mary Hopkins; B. F. Armas, R. L. Ashbaugh, R. A. O'Connor, C. F. Roderick; 491, D. J. Gorham, D. W. Mayberry; 507, F. E. Heinzelman Jr.; K. D. Millard; 512, A. C. Taranto; 517, A. E. Banks; 524, Margaret B. Bailey, Doris E. Gilbert; 526, H. P. Kelly, P. R. Moran; 531, R. R. Romanowich; 565, Marlene J. Shelton; 566, W. F. Morris; 572, R. E. Hanson; 574, J. Durcan, A. A. Canegaly; 579, F. J. Szafranski; 583, Stanley P. Pizkin Jr.; 585, M. J. Hurley Jr.; 589, A. Van Duren; 591, D. A. Buck, E. M. Slick; 595, N. J. Caesar Jr.; J. D. Neilson, W. S. Pomeroy Jr., W. C. Tonelli; 697, Kenneth R. Hinman; 731, R. E. Boyd, E. R. Mukievicz; 732, E. G. White; 810, D. R. Wall; 820, H. W. Sass; 840, Mary C. Nugent; 951, E. B. Broadbent Jr.; 953, J. L. Mumford, H. J. Sowards; 956, W. E. Crow, L. L. Stoman; 9588, J. A. DeShazo; 962, C. H. Shelton; 966, G. C. Wilson; 979, W. C. MacDaniel, J. A. Smith, K. S. Taylor; 985, D. T. Barber, R. E. Dailey, K. W. Mallison; 986, L. G. Wilson; 988, D. T. Chu; 989, W. F. Crocker, B. Shiba; 999, L. L. Posey.

Ten-Year: Dept. 046, Starlene B. Cower, D. L. Munson; 101, Dorlys W. Sweeney; 141, Herta G. Warner; 142, S. Arimura, E. T. Bedell, J. L. King; 144, J. J. Dispenza; 149, G. R. Fernell, R. S. Geibel; 151, T. W. Sweeney; 193, Marilyn A. Smith; 195, D. E. Coffee, D. E. English, R. C. Sebald Jr.; 202, Theresae K. Galatis; 203, Vivian M. Brown; 221, S. C. Walker; 223, J. Smith; 250, H. R. Chapman, G. Winters Jr.; 400, J. F. McConnell; 491, J. H. Ward, T. L. Woodin; 511, J. A. Goldsberry; 518, V. W. Spice; 524, Katherine Szafranski; 526, J. H. Aubrey; 553, E. C. Horbett Jr., A. J. Treglaff; 573, D. A. Nirschi; 587, J. A. Opsahl; 589, R. D. Harris; 592, D. W. Vorbeck; 952, E. H. Bock; 958, J.

Silverstein, D. J. Wilcox; 962, G. H. Broad, J. C. Gray; 966, E. S. Rosenbaum; 967, L. D. Harber; 979, D. Jack, H. R. Van Wie Jr.; 985, T. M. Heter II; 986, R. E. Roberts Jr.; 999, T. Chacon.

Retirements

CONVAIR

ASH—Dennis D., Dept. 002-0. Seniority date Sept. 29, 1956, retired April 20.

BIHM—Francis F., Dept. 131-1. Seniority date March 5, 1958, retired May 28.

DEAN—Leon E., Dept. 732-0. Seniority date Nov. 29, 1946, retired May 28.

FISCHER—Louis, Dept. 016-0. Seniority date March 2, 1936, retired May 28.

GLIEBE—Joseph A., Dept. 049-0. Seniority date Dec. 2, 1935, retired May 28.

HALLINAN—Kenneth, Dept. 105-0. Seniority date April 21, 1969, retired April 30.

JACKS—Loren D., Dept. 553-5. Seniority date Jan. 6, 1958, retired April 23.

KLINE—John M., Dept. 732. Seniority date Oct. 13, 1932, retired May 28.

KUDERNA—Jerry, Dept. 401. Seniority date April 14, 1941, retired May 28.

MASS—Earl H., Dept. 731-0. Seniority date Oct. 19, 1949, retired May 28.

McMINN—James, Dept. 250-4. Seniority date Nov. 4, 1946, retired May 21.

McMINN—Lucy S., Dept. 842-0. Seniority date May 12, 1947, retired May 21.

THRALL—Leonard P., Dept. 131-7. Seniority date July 6, 1965, retired May 28.

TORGERSEN—Walter S., Dept. 756-0. Seniority date Sept. 11, 1956, retired May 14.

Rider-Driver

CONVAIR

RIDERS / CAR POOL WANTED—From 2nd and Madison Sts., El Cajon to Lindbergh Field plant, 7 a.m.-3:30 p.m. shift. Call Louie Bogt, ext. 1931 LF or (home) 448-1260.

RIDE WANTED—From Mira Mesa to Lindbergh Field plant, 7 a.m. to 3:30 p.m. shift; phone John Velazquez, ext. 2944 or 2800 LF or (home) 271-7518.

Personals

CONVAIR

I wish to extend my sincere appreciation and thanks to all who participated and wished me well in my recent retirement.

Joe Gliebe, Dept. 049

Our deepest gratitude to all who expressed their sympathy at the passing of our loved one.

Carlo Costantino, Dept. 020

I wish to thank the many friends for the retirement party, the nice gifts and their expressions of good wishes.

Leon E. Dean, Dept. 732-0

Thanks to all of my friends who said and did so many nice things to make my retirement a very pleasant occasion.

Jack Kline

Births

CONVAIR

TOMPKINS—Son, Michael Allen, born May 20 to Maurice (Dept. 989-9) and Gypsy (Dept. 518-0) Tompkins.

Deaths

CONVAIR

COSTANTINO—Mariana C., Dept. 700-0, died June 1; survivors include her husband, Carlo, and two sons, Ralph and Richard.

STOUGHTON—Marshall F., Dept. 195-3, died June 12; survivors include his wife, Donna, and three daughters including Mrs. Lonna Davidson and Mrs. Cyndi DeCourcy of San Diego.

COWIE—Robert H., Dept. 401-4, died June 12; survivors include his wife, Madora, and two daughters, Mrs. Robert Wright and Mrs. Carolyn Mills.

OSTERMEYER—Kenneth D., Dept. 195-0, died June 13; survivors include his wife, Mary Ida; two sons, Charles and Robert; and a daughter, Maryann.

Mariner Flight Toward Mars Is on Schedule

Mariner 9, launched with precision May 30 by Convair Aerospace Division's Atlas-Centaur 23, has settled down for a 161 day cruise to a rendezvous with Mars following a mid-course maneuver to make a slight adjustment in its velocity.

NASA and Jet Propulsion Laboratory officials said the spacecraft has continued to perform flawlessly. In the mid-course maneuver on June 4, Mariner 9's 300-pound-thrust engine was fired 5.11 seconds for a velocity change of 15.08 miles per hour.

Three days later, NASA reported the modern Mariner was 1,290,000 miles from earth, traveling 6,826 miles an hour, and had covered 13,533,000 miles on its arcing trajectory to Mars.

On its original course from launch at Cape Kennedy by Atlas-Centaur 23, Mariner 9 would have flown past Mars about 16,000 miles from the surface. NASA officials said it was deliberately aimed at this point to insure it would not impact Mars and contaminate the planet with micro-organisms from earth prior to a life search on Mars planned for the unmanned Viking missions in 1976.

The first mid-course maneuver was planned to place Mariner 9 in a new flight path that would skim past Mars at approximately 1,000 miles from the surface. A second mid-course maneuver is planned about Oct. 24 if necessary to further correct the trajectory.

A 14-minute burn of the on-board rocket engine on Nov. 13 will insert the spacecraft into an orbit about Mars with a low point of 750 miles and a high point of 10,000 miles.

Plans call for Mariner 9 to return scientific data on Mars atmosphere and surface and 5,000 to 6,000 photographs during a period of at least 90 days while it is orbiting the planet.

The commands to perform the mid-course maneuver were sent from the Space Flight Operations Facility at Jet Propulsion Laboratory in Pasadena, Calif., through a tracking station in Woomera, Australia. Jet Propulsion Laboratory is managing the Mariner project for NASA.

Basic Computer Course Offered

Educational services at Convair Aerospace-SD for the second time is offering a basic computer course covering the fundamental concepts of data processing and computer programming.

Open to both hourly and salaried personnel, the 9-week program will be held from 4:15-6:15 p.m. Tuesdays and Thursdays at the Lindbergh Field plant beginning July 6. Jack James will instruct.

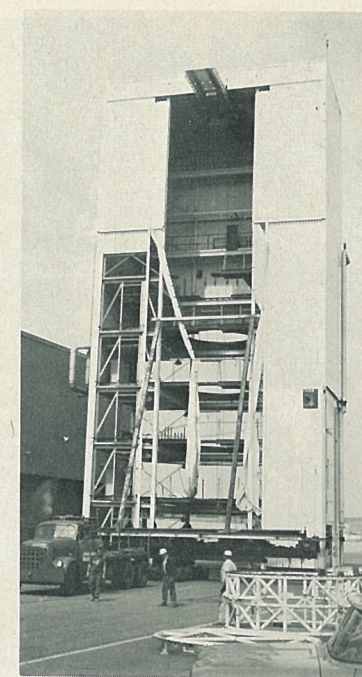
There are no prerequisites and no registration fees. The class will be limited to 25 students. Information is available through educational services, ext. 2564 LF.



Kropp Is Leader In Pistol Shoot

Thirteen members of CRA Pistol Club fired in the organization's regular bi-weekly competition June 13 on the San Diego police range.

Winners in .22 firing were Charles Kropp in master class at 290, Dick Sutton in expert



TOWER TRANSIT—Vertical assembly tower, rising almost 100 feet above roadway, moves toward new location adjacent to factory building at Kearny Mesa plant. Tower is used for "stackmate" of Centaur vehicles and related adapters and fairings.

Monster (150-Ton) Is Relocated at Kearny Mesa Plant

A 94-foot-high, 150-ton tower used in "stackmate" mechanical-fit checks of Centaur launch vehicles and related interstage adapters, payload adapters, and nose fairings recently was moved from NASA's Combined Systems Test Stand (CSTS) on Balboa Avenue to a new location adjacent to the south end of the Bldg. 5 factory at the Kearny Mesa plant.

Now renamed vertical assembly tower (VAT), it is being refurbished prior to start of stackmate of Atlas-Centaur 28 components July 27 as part of the preparation for an Intelsat IV communications satellite launch mission.

It also is scheduled for use later in stackmate operations for new improved Centaur D-1A and D-1T launch vehicles and their flight hardware.

Richard Jumont, resident representative at Kearny Mesa for the NASA Lewis Research Center, said NASA has released the CSTS facility to the federal General Services Administration for disposition and authorized move of the tower to the more convenient location adjacent to the Kearny Mesa factory.

The CSTS facility was used for systems tests and simulated launch of Atlas and Centaur vehicles during the Surveyor program. It has been in a minimum maintenance status since that time with only the adjacent tower being used for the mechanical stackmate tests.

John Harrison, senior project engineer for Centaur ground support equipment, said 18 Centaur vehicles and related adapters and fairings have been processed through the tower.

The tower was the tallest structure ever moved by the John Hansen house moving firm. After 10 days of preparation, the big structure was moved in only one day along an in-plant road connecting the CSTS site with the Kearny Mesa factory building. Ninteman Construction Co. is handling refurbishment of the structure.

The VAT at its new location is only about 40 feet from the Centaur checkout dock in Bldg. 5.

Known Around Globe, Scotty Doig Soon Will Be Retired

John "Scotty" Doig, who has received unprecedented recognition from the world's airlines for his work as manager of the spare parts department for Convair Aerospace-SD, retires June 30 after more than 38 years with the company and 41 years in the aircraft business.

A native of Scotland, Doig emigrated to the U.S. in 1929, joined Consolidated Aircraft Co. as a riveter in Buffalo, N.Y., the following year, moved to San Diego as a leadman on the PB-2A fuselage in 1935, and worked on almost every type of aircraft the company built from the Commodore to the F-106.

After years of factory duty that culminated in service as factory superintendent at Lindbergh Field and factory manager at Plant 2 (now AF Plant 19), Doig took what was to be a special three month assign-



"Scotty" Doig

ment in spares in 1957—and has been there since.

His name has become synonymous with that of Convair to many of the world's airline administrators, engineers, and chief mechanics. His duty in helping keep Convair aircraft flying has taken him to Norway, Sweden, Denmark, Finland, Germany, Holland, Belgium, France, Spain, Algiers, Italy, Switzerland, Yugoslavia, Lebanon, Jordan, China, Japan, Indonesia, the Philippines, Thailand, Brazil, Venezuela.

"An airplane is only a collection of spare parts flying in close formation," says a calling card "Scotty" has left with airline people around the world.

In addition to providing spare parts, Doig and others from Convair have "saved" several Convair-liners that have been damaged in accidents, fires, and other mishaps around the globe.

In one case in 1963, a Convair 440 was put together "like a new one" for Finnair at Doig's suggestion from the remains of two wrecked planes—a fuselage from Kar-Air of Finland and a wing from Jugoslovenski Aerotransport of Yugoslavia. The wing was trucked through Russia to Helsinki for the rebuilding task.

"Convair planes are almost indestructible and with a little care and a few spare parts will fly forever," Doig said. "I saw a PBY we produced in 1935 still flying in Taiwan a few months ago."

One of Doig's office walls is lined with commendations from the airlines.

His most recent award was presented May 14 by Swissair in Zurich at a dinner in Doig's honor arranged after officials there learned he was on vacation in Scotland.

Doig also is noted for his interest in golf and soccer and for his abilities with the bagpipes.

GD Alumni Club To Hear Coggan

General Dynamics' Alumni Club will see a color film on life in Russia at its luncheon meeting at 11:30 a.m. July 13 in the CRA Clubhouse auditorium. B. F. "Sandy" Coggan, president of the Economic Development Corp. of San Diego County who has made several trips to the USSR, will narrate the film.

All retirees and their wives husbands are invited. Reservations are required and may be made by phoning ext. 1111 KM.



"STAR" HONOR—Richard M. Buss, center, a senior design engineer in Convair Aerospace-SD's Dept. 511-6, receives record 10th DC-10 program "Gold Star" award for implemented cost reduction projects saving \$328,300. Jack Hurt, left, DC-10 program manager, made presentation as Bill Service, Ford White, and Max Yale were on hand to offer congratulations.



AWARD ARRAY — Ron Reekers, a Convair Aerospace-SD inspector, looks over table top filled with 40 Employee Suggestion award certificates he has received during 13 years with the division. He's holding first and last received.

Inspector Celebrates 40th ES Award Check; In 13 Years He Has Pocketed Over \$1,000

Ronald R. Reekers, an inspector in Convair Aerospace-S.D.'s Dept. 143-1, recently was presented the 40th Employee Suggestion award check he has received during 13 years with the division.

While this may not be a record, Reekers considers it positive proof that any employee can earn extra cash and receive recognition for good ideas that will improve procedures, equipment, and materials in the area in which he works.

Reekers has received more than \$1,000 for his suggestions in addition to certificates in three different sizes and a variety of colors. His suggestions have run the gamut from simple safety and material handling ideas to development of a

gauge for use in inspecting printed circuit boards.

He figures at least three of every five Employee Suggestions he has submitted have been approved and implemented.

"Some people I know won't turn in Employee Suggestions because they submitted one once they thought was good and it was rejected," Reekers said. "My experience indicates that a person who continues to submit reasonable and logical suggestions can expect to have many of them approved."

Reekers knows that it doesn't take an engineer or genius to come up with a good Employee Suggestion. "All you have to do is keep your eyes open and think about how something can be done better, easier, or safer," he said.

CRA Calendar

(For information on CRA activities call CRA headquarters, ext. 1111 KM. Deadline for next issue of GD/WORLD is June 29. Call ext. 1071 LF or 3322 KM. All meetings are held in CRA Clubhouse unless otherwise noted.)

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BADMINTON—Call Al Van Norman, 222-4867, for information.

BICYCLE CLUB—Oceanside 50-mile ride, June 26, Call Bob Williams, ext. 1626 KM for information.

BONAIR FLYERS—Meet 7:30 p.m., July 1.

BRIDGE—Duplicate bridge sessions, 7:30 p.m. each Friday.

CERAMICS—Meet 9 a.m.-noon and 7-10 p.m., Tuesdays and Thursdays.

CHORUS—Rehearsals 7:30 p.m. each Monday.

COUNTRY & WESTERN MUSIC—Meet 7:30 p.m., Thursdays, CRA Missile Park picnic shelter.

FENCING—Workouts and instruction 7:30-10:30 p.m., Fridays. YWCA, 10th & C Sts.

GARDEN CLUB—Meeting 7:30 p.m. July 7, Floral Association Bldg., Balboa Park.

GOLF—Tecolote tourney, July 17-18, 6:30 a.m. tee-off.

GUN CLUB—Fun shoot, 9 a.m., June 27, Gillespie Field Range.

HEALTH CLUB—Open 9:30 a.m.-10 p.m., Monday through Thursday; 9:30 a.m.-9 p.m., Fridays; 9 a.m.-noon, Saturdays; "women only" weekdays, 9:30-11 a.m.

ICE SKATING—GD family skate night 6:15-7:45 p.m. each Thursday, House of Ice, Interstate 8 and Lake Murray Blvd. Flat rate fee \$1 (includes skates).

JUNIOR SCIENCE—Meeting 7:30 p.m., July 2.

MINIATURE RAILROAD—Operating sessions Saturdays, Sundays, and holidays, CRA Missile Park.

MODEL HO RAILROAD—Work sessions 7 p.m. each Tuesday, CRA Missile Park.

PISTOL CLUB—Shoot 9:15 a.m., June 27, San Diego Police Pistol Range, Federal Blvd. & Home Ave.

RADIO CLUB—Meet 7:30 p.m., July 1.

RETIREES—Luncheon meeting 11:30 a.m., July 13.

RIDING CLUB—Pinecrest campout, July 9-10.

RIFLE CLUB—Senior shoot 7 p.m. tonight (June 23); Junior shoot 9 a.m., July 3; Gillespie Field Range.

ROADRUNNERS—Meet 7:30 p.m., June 24, Gillespie Field Clubhouse.

ROCKHOUNDS—Meet 7:30 p.m., July 7.

SAILING CLUB—Meet 7:30 p.m. tonight (July 23).

SCULPTURE—Workshop sessions 7:30 p.m. each Monday.

SKI CLUB—Water skiing each Wednesday, 5 p.m., Crown Point Landing. Meeting 7:30 p.m., July 6, South Bay Club recreation room.

SPECIAL OFFER—Canned hams, 10 lbs. 8 ozs. available at CRA Clubhouse weekdays and CRA Missile park weekends, \$10.

SQUARE DANCE—Dance 8-10 p.m. each Thursday.

STAMP CLUB—Meeting 7:30 p.m., June 24.

SWIMMING—Family swim night 7-9 p.m., July 17, Mission Beach Plunge. Tickets at employee benefits, 5 cents.

TOASTMASTERS—Convair Toastmasters meet 4:30 p.m. each Wednesday. Dynamic Toastmasters meet 5:30 p.m. Thursdays.

TRAILERS—Meeting 7:30 p.m., July 6.

WOMEN'S GOLF—Fletcher Hills tourney, July 10, 9 a.m. tee-off.

Six Convair Skiers Get Race Trophies

Six members of the Convair-Don Diego Ski Club were awarded trophies at a banquet Saturday (June 19) for having amassed greatest number of points in 1970-71 intramural snow ski races sponsored by the San Diego Council of the Far West Ski Association.

Winners and their divisions were Tom Boren, intermediate men; Bill Gallaher, beginner men; Juliana Bartek, advanced women; Jean Boren, intermediate women; Isabel Padilla, beginner women; and Bobby Bell, junior.

The Convair-Don Diego club also was honored for having the best club record in the intramural races at 377 points. Runners-up were Torrey Pines Ski Club at 239, San Diego Ski Club at 157, and Auslich Ski Club at 102.

Harry Eastman, snow ski commissioner for the Convair club, has been elected president of the San Diego Council of the ski association for the coming year.



BUYERS — Representatives from 12 divisions attended a Corporate Volume Purchasing Coordination meeting at Fort Worth operation recently. C. J. Fimmano, Corporate administrator-procurement materials, seated center, chaired meeting.

Direct Dialing to Fort Worth Scheduled to Begin in July

Direct telephone dialing between General Dynamics' San Diego and Fort Worth facilities will begin July 6 as a series of changes are implemented to expand communications service and save Convair Aerospace Division, Electro Dynamic Division, and Stromberg DatagraphiX more than \$300,000 a year.

Doug Zink, group supervisor of office services for Convair Aerospace - SD, said 12 "dedicated" phone lines will link the Convair Aerospace-SD Lindbergh Field plant switchboard in San Diego with that at the Fort Worth plant.

"Conversion to direct station-to-station dialing will greatly simplify calling between the two cities since it will no longer be necessary for each call to be handled by an operator," he said.

Lines for the new California-Texas Telecommunications System (CATTS) can also be used at night for high-speed data transmission between the two Convair Aerospace operations.

Implementation of the new system also will make possible direct dialing between San Di-

ego facilities and the General Dynamics Field Office in Houston in support of the Space Shuttle program. The Houston office, where Convair Aerospace-SD has a Space Shuttle field office, will have two direct lines off the Fort Worth switchboard.

Stromberg DatagraphiX facilities in San Diego and El Cajon, Calif., also will be tied in to the Lindbergh Field plant switchboard beginning July 6. The new base number for all DatagraphiX locations in San Diego will be 291-9960.

General Dynamics personnel using the Kearny Mesa telephone facilities will dial "56" to place calls over interstate WATS (Wide-Area Telephone Service) lines and "57" for connection to California WATS lines. Those using the Lindbergh Field facilities will dial "6" to place calls over interstate WATS lines and "7" for connection to California WATS lines.

Calls to the Los Angeles area (area code 213) from Lindbergh Field and Kearny Mesa can be placed directly by dialing "49" and the number being called. Calls to the Orange County area (area code 714) can be placed directly by dialing "47" and the number being called.

Zink said all Convair Aerospace-SD WATS line terminals are being moved from Kearny Mesa to the Lindbergh Field plant as the new communications system is implemented.

After July 6, Convair Aerospace-SD switchboards will be in operation Monday through Friday from 6:30 a.m. to 10 p.m. at Lindbergh Field and from 6:30 a.m. to 6 p.m. at Kearny Mesa. Calls for employees working at the Kearny Mesa plant after 6 p.m. must be placed through the Lindbergh Field switchboard, 296-6611.

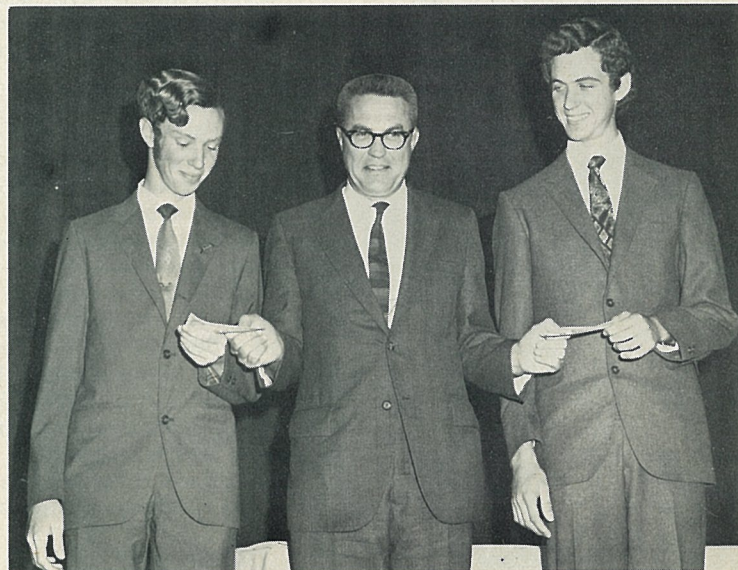
Reduced-Price Tickets Offered For Two Events

CRA outlets have reduced-price tickets for the 8:30 p.m. July 3 presentation of "The Sound of Music" at Wegeforth Bowl in the San Diego Zoo and for the 6 p.m. July 11 "Disney on Parade" show at San Diego International Sports Arena.

Tickets for "The Sound of Music" are \$3.50 (a \$1 saving) and must be purchased by June 30. Tickets for "Disney on Parade" are available at \$4.50 and \$3.50 (also a \$1 saving for each) and have a July 7 purchase deadline.

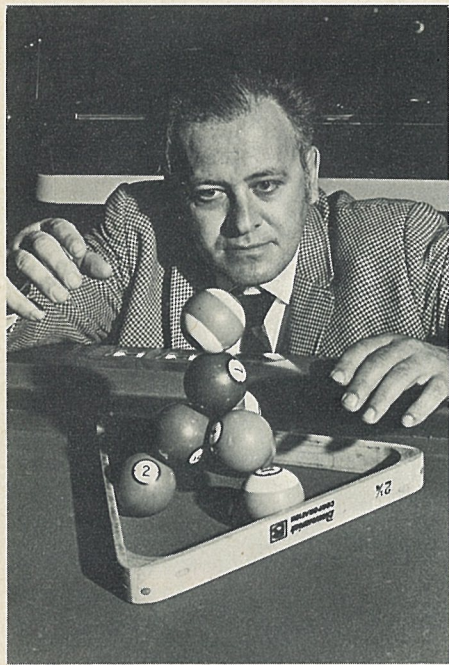


SAFETY AWARD — Kearny Mesa plant reliability control Dept. 143 won Convair Aerospace-SD's April safety competition with employees' names being entered in drawing for free safety shoes or item of similar value. Safety engineer Spence-Preston draws winner's name in top photo as Peggy Nichols, left, and Linda Cruz hold raffle box. In lower photo, Don Miller, left, chief of process control-quality engineering, and Ernie Cox, right, safety crib attendant, assist the winner Tom G. Phillip, a reliability and quality control project administrator, in making his selection.



MATH PAYOFF — Lyman Josephs, Convair Aerospace Division vice president, presents \$100 bills to high scorers in annual math contest sponsored by Convair Aerospace-SD and UCSD. Frederick Biedenweg of Clairemont High, left, was high scorer for city schools and Cliff Janson of Helix High, right, was high scorer for county schools. Raymond Greenwell of University High also received \$100 for highest score for independent schools but was not present for awards ceremony.





BALANCING ACT—Gil Fanale, lead instructor in Stromberg-Carlson technical training center, demonstrates one of his billiard tricks. Fanale is a past county billiards champion and also former New York State archery champion. On request, he has passed along tips on both billiards and archery to some of his XY school students.

Sam Keith Re-elected To AF Assn. Board

Sam E. Keith Jr., transportation manager at Fort Worth, was elected to the Air Force Association board of directors for a second term at a recent meeting in Colorado Springs.

Keith has previously been honored with three top AFA awards: Medal of Merit in 1966; Exceptional Service plaque in 1967; and National Man of the Year in 1968.

He previously served as president of the Fort Worth and state chapters of the organization and was southwest regional vice president for two years.

'Original Doody' Now Carpenter at Groton

"Howdy-Doody" is alive (and an Electric Boat Division carpenter).

In 1950 five-year-old Billy Oltmann topped 17,230 rivals and won prizes galore as the youngster most resembling TV's Howdy-Doody, posing with the famed puppet for a nationally circulated photo.

Today Billy (William A.) is a carpenter in Electric Boat's shipping department at the division's Midway facility. He often recalls his big day and has several requests for appearances during the current revival of Howdy-Doody interest among now-grown tots who sat glued to their sets 20 years ago.



Bill Oltmann



RINGER—Widely circulated photo shows Electric Boat's Billy Oltmann as he posed with puppet "Howdy-Doody" many years ago.

National Merit Scholarships Awarded to Five

Five sons of General Dynamics employees have been awarded four-year General Dynamics-sponsored National Merit Scholarships for use at colleges and universities of their choice.

All completed their senior year in high school recently with outstanding scholastic, extracurricular activity, and National Merit test records.

Listed by operating unit and city in which the parent is employed, they are:

Convair Aerospace, San Diego—John G. Frelinger, son of John E. Frelinger, systems integration engineer.

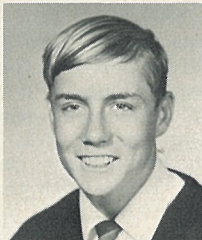
Convair Aerospace, Fort Worth—Charles E. Curtis, son of Fred A. Curtis, an aerospace engineer.

Electric Boat, Groton—Richard A. Waldron, son of Francis J. Waldron, a draftsman.

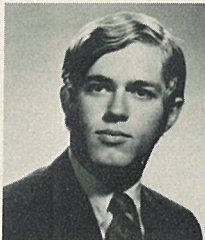
Electro Dynamic, Pomona—Stephen E. Hansen, son of Mrs. Janet G. Hansen, manufacturing analyst.

Stromberg-Carlson, Rochester—Geoffrey T. White, son of Thomas E. White, an engineer.

Frelinger is a graduate of Hilltop High in Chula Vista, Calif., where he was Erudite president, Assembly representative, Science Club vice presi-



John Frelinger



Stephen Hansen



Geoffrey White



Richard Waldron



Chas. Curtis

dent, and Key Club secretary. He has organized several service projects and won Science Fair and Honors Math awards. He will attend Stanford.

Curtis, a graduate of Arlington Heights High in Fort Worth, worked in a "Write Hanoi" campaign last summer, has been in Explorer Scout Post efforts to curb pollution, and has been commended for assisting his high school teachers with their duties and other students with academic studies. He will study aeronautical engineering at Swarthmore College in Pennsylvania.

Waldron attended Norwich Free Academy in Norwich, Conn., where he held three student offices and played in the school band and orchestra. He has been employed part-time as a chemical laboratory assistant. He will study physical sciences at Princeton.

Hansen is a graduate of Alta Loma High in Alta Loma, Calif., where he was Student Senate parliamentarian, athletic commissioner, chairman of the Student Drug Abuse Committee, and sophomore class president. He also has been active in scouting and served as junior assistant scoutmaster. He will study electronics engineering at Stanford.

White is a graduate of Eastridge High in Rochester where he has studied German and played flute in the school band four years. He has been active in scouting several years and has been librarian, scribe, assistant senior patrol leader, and senior patrol leader for his troop. He will study engineering at Worcester Polytechnic Institute.



ENGINEER OF THE YEAR—C. W. (Bill) Schertz (center) is about to receive \$1,000 check on being named General Dynamics Engineer of the Year for 1970. Presenting check at right is Jack Bowers, president of Electro Dynamic Division, along with W. J. Morrow, vice president and general manager of Pomona operation where Schertz serves as engineering staff specialist. Schertz won award for his work in development of advance gun systems techniques based on original concepts.

Advanced Systems Technique Earns 'Engineer of Year'

C. William Schertz has been named General Dynamics "Engineer of the Year." The award includes a \$1,000 honorarium.

Schertz is an engineering staff specialist at Electro Dynamic Division operation in Pomona. He won the award for his work in development of advanced gun systems techniques based on original concepts. His technical contributions to radar controlled gun aiming was instrumental in the Pomona operation receiving a Navy development contract for a new defensive weapon.

Earlier, Schertz received the Pomona operation's Design Achievement Award along with a \$500 honorarium. He then became Pomona's nominee for the Corporate-wide competition that included engineers from other operating divisions and subsidiaries.

Schertz joined General Dynamics' Pomona operation in 1951, working primarily in missile guidance, microwave and mechanical design. He was supervisor of guidance design for Navy missile systems and for two Army systems. In the mid-1960s, Schertz began developing concepts combining his knowledge of gun systems, microwave and radar. This evolved into the work for which he won the award.

The Design Achievement Award program was begun by General Dynamics in 1969 to emphasize the Cor-

poration's great interest in engineering excellence.

Award recipients in other General Dynamics units during 1970 were:

Canadair Limited, Montreal, Canada, G. N. Adams for design of a V/STOL propeller scheduler.

Convair Aerospace Division, Fort Worth operation, W. D. Buntin for development and application of fracture mechanics test and analysis methods.

Convair Aerospace Division, San Diego operation, Dr. Hideo Yoshihara for his contribution to the design of transonic airfoils.

Electric Boat Division, Groton, Conn., William S. Berry for improved submarine system performance.

Quincy Shipbuilding Division, Quincy, Mass., Frederick G. Rolfe for elevator design achievement on a new class of cargo vessels.

Stromberg-Carlson, Rochester, N.Y., Otto Altenburger for the design of an electronic switching center system.

Stromberg DatagraphiX, San Diego, Calif., Charles R. Corpew for the development of the all-magnetic CHARTRON® Tube.

G. M. Almy Will Present Maintainability Paper

G. M. Almy, Dept. 61-1 at Fort Worth operation, will present a paper on "Maintainability" at the 10th annual Reliability and Maintainability conference in Anaheim, Calif. June 28-30.

People Mobility

Personnel Transfers Within GD

(Following are recent personnel transfers within General Dynamics. In parentheses are dates when individuals joined the company.)

CHARLES W. MARROW (1961) from Stromberg-Carlson-Charlottesville to Stromberg-Carlson-Rochester as equipment engineer; ELWOOD K. FREE (1966) from S-C-Roch. to senior plant engineer, Electric Boat; WALLACE M. AKIMOTO (1962) from Convair Aerospace-SD to Electro Dynamic-SD as senior engineer; RONALD R. ANGE (1967) from S-C-Roch. to S-C-Orlando as budget analyst; JOSEPH GALIAN JR. (1956) from Convair-SD to ED-SD as senior engineer; EDWIN D. BOWEN (1968) from Convair-SD to senior engineer, ED-SD; GEORGE S. FLETCHER (1956) from Convair-SD to ED-SD as engineer; LEONARD G. CLOUGH (1959) from Convair-SD to senior engineer, ED-SD; DONALD BROWN (1958) from Convair-SD to senior engineer, ED-SD; IRWIN C. ROODER (1946) from ED-SD to Convair-SD as tool engineer; HELMUTH H. LAUE (1958) from Convair-SD to senior engineer, ED-SD; PAUL T. YASUHARA (1958) from Convair-SD to senior engineer, ED-SD; ARTHUR J. EAGLE (1955) from ED-Roch. to ED-SD as industrial engineer; HAROLD H. TRACY JR. (1957) from Convair-SD to senior engineer, ED-SD; RICHARD J. WALLER (1952) from Convair-SD to ED-SD as manufacturing analyst; E. T. LIPSCOMB JR. (1962) from Convair-SD to ED-SD as senior engineer.

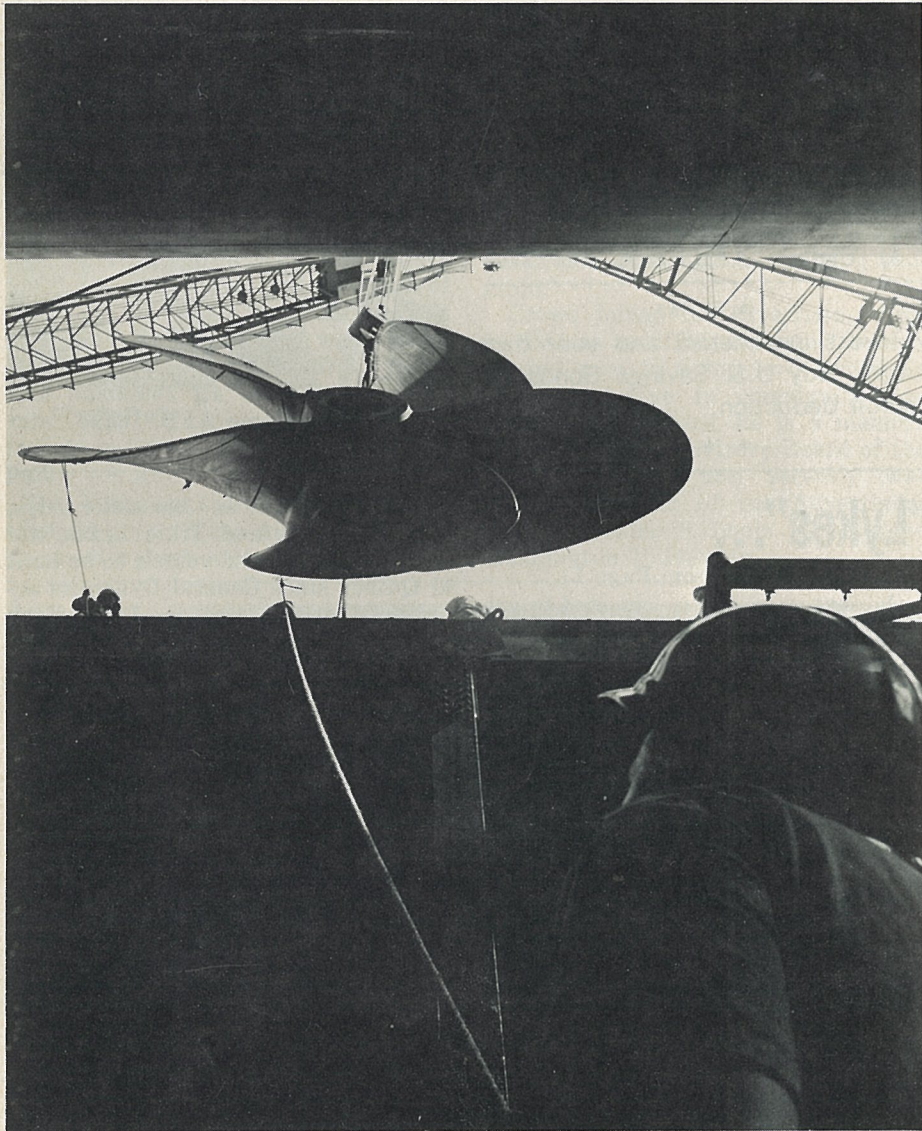
General Dynamics World

Vol. 1, No. 3

PUBLISHED BY GENERAL DYNAMICS CORPORATION

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July 7, 1971



PROPELLER DROP — Workman waits below as "Doctor Lykes" propeller is dropped into position prior to installation at Quincy Shipbuilding Division. The 45-ton propeller was lowered sideways between the building basin wall and the ship's cantilever stern, since normal access was obstructed by work on 200-ton capacity elevator platform.

First F-111F Rolls Off Line On Schedule, 100 Pct. Complete

The first model of the F-111F series rolled off the assembly line June 23 on schedule and "100 per cent complete."

"This means we rolled out a ready-to-go airplane—no loose ends," said R. W. McGuffee, vice president-operations. "We've never had this much success before on the first model of any of the 111 series."

The "F" version of the F-111 will have about 20 per cent more thrust than earlier models, thanks to new and more powerful TF30-P-100 engines. These engines will give the aircraft greater performance throughout its flight envelope.

Following rollout, F-111F No. 1 was phased through the cold proof-test program. Next on the agenda is a Tactical Air Command-type paint job.

Between July 15 and Aug. 9, F-111F No. 1 will undergo ground-vibration and flight-control tests. It is slated to enter field operation Aug. 10 and make its first flight Sept. 13.

Actually, one of the later "F" aircraft—probably 2, 3 or 4—will make the first flight for the new model in late August, since none of these aircraft will undergo the vibration test.

McGuffee praised the efforts of both company and Air Force personnel in turning out the F version on schedule and in "such excellent shape."

★ ★ ★

F-111F No. 1 was promptly readied for cold proof-testing.

The No. 1 "F" version is the first of nine of these models slated for cold proof-testing at Fort Worth operation.

"We have submitted a proposal to proof-test the remaining "F" models—Nos. 10 through 70," said A. S. "Doc" Witchell, 111 program director, "and we expect to hear from the Air

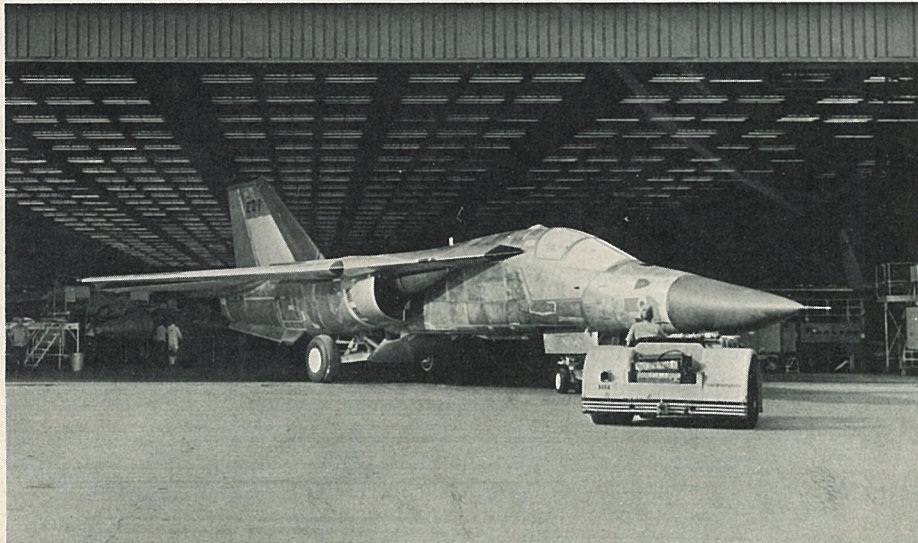
Force in the near future."

Fort Worth has proof-tested 253 F-111s and returned 189 of these aircraft to using commands. The other 48 aircraft are being readied for return to Air Force units.

Other than the first nine "F" models, the only other F-111 currently slated for proof-testing at Fort Worth is FB-111A No. 3. It's scheduled to enter the program soon.

At Sacramento Air Materiel Area, a total of 64 aircraft have been cold proof-tested; 38 of these have been delivered. Proof-testing of five F-111As in the near future will probably wind up this activity at the California base.

A total of 38 F-111s were tested and
(Continued on Page 3)



MORE POWER — First "F" model of the F-111 rolls off the Fort Worth operation assembly line on schedule. Equipped with more powerful T F30-P-100 engines, "F" version will have greater performance throughout its flight envelope.

'Doctor Lykes' Christening Slated July 10

Andrew E. Gibson, Assistant Secretary of Commerce for Maritime Affairs, will be principal speaker at the christening of the General Dynamics-built "Doctor Lykes," largest dry cargo carrier in the world. The ceremony is scheduled for July 10 at Quincy Shipbuilding Division.

"Doctor Lykes," built for Lykes Bros. Steamship Co., Inc. of New Orleans, has been widely hailed for its unique design, incorporating a specially engineered stern elevator, and for the impetus it will give to the revival of the American Merchant Marine. Secretary Gibson is regarded as the chief architect of the Merchant Marine Act of 1970, which provides for construction of 300 ships over the next ten years.

"It is fitting that Mr. Gibson will share in this truly historic christening," said Lloyd Bergeson, general manager of Quincy Shipbuilding Division. "His entire career has centered around maritime activities. He has fought for a strong domestic commercial shipping industry, and he was present at the keel-laying of 'Doctor Lykes' almost exactly a year ago. In a very real sense, the occasion is his as well as ours."

The 49-year-old Gibson has compiled an extensive background in his field. He graduated from the Massachusetts Maritime Academy, and became one of the youngest merchant ship captains in recent history by receiving command of a United States Line freighter.

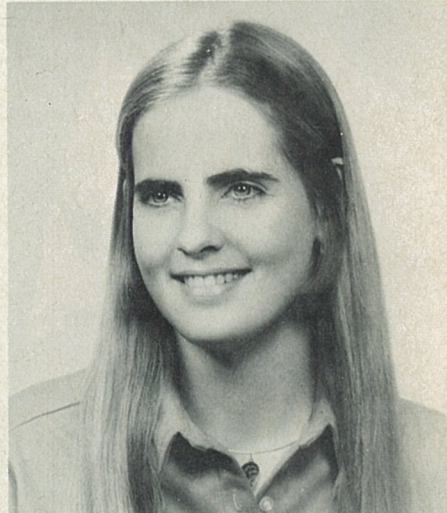
He has been vice president of the New York Shipping Association, a member of the advisory board of the U.S. Merchant Marine Academy, a governor of the Propeller Club of New York, and a director of the National Cargo Bureau.

Gibson was appointed to his present office by President Nixon in October, 1970, and after confirmation by the Senate was sworn in by Secretary of Commerce Maurice H. Stans. He had been maritime administrator in the Department of Commerce for 19 months prior to assuming his new post.

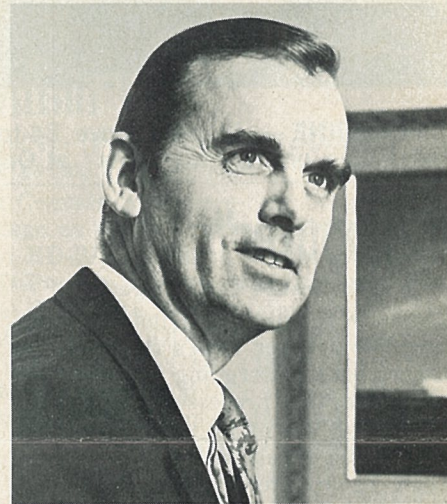
In addition to his maritime education, he holds a Bachelor of Arts degree from Brown University and a Master of Business Administration from New York University.

"Doctor Lykes" is the first of a new class of cargo carrier known as "Seabees." When she goes into service

(Continued on Page 2)



SPONSOR — Miss Ashley Lykes, daughter of Joseph T. Lykes Jr., Chairman of Lykes Bros. Steamship Co., Inc., New Orleans, La., will sponsor "S.S. Doctor Lykes" at christening July 10.



SPEAKER — Andrew E. Gibson, Assistant Secretary of Commerce for Maritime Affairs, will be chief speaker at christening.

'Computer Gap' Contract Won

Convair Aerospace Division's San Diego operation has been awarded a \$1.75 million contract by the Air Force Space and Missile Systems Organization to develop the major element of a system that will overcome the "credibility gap" between different computers and permit pooling of computerized space launch vehicle guidance data.

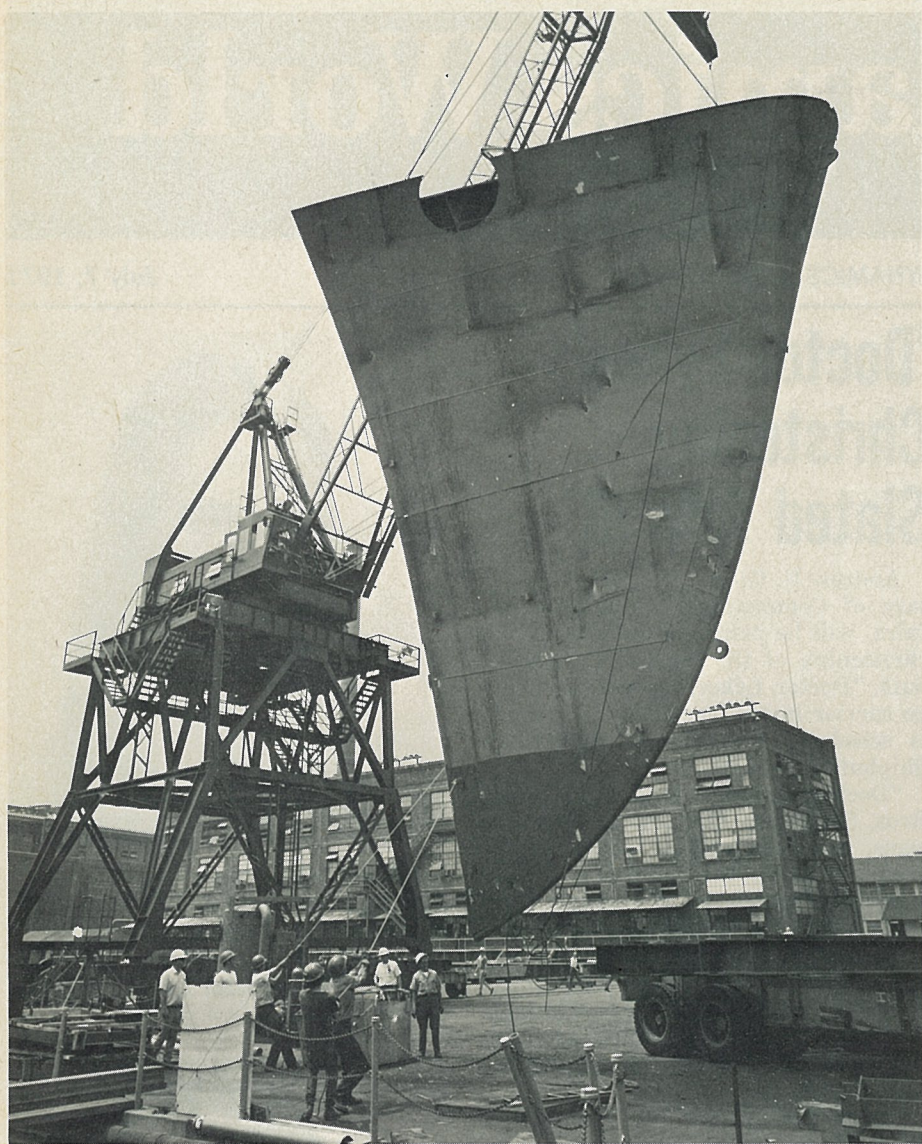
Under the two-year contract, Convair Aerospace-SD and two subcontractor firms will design and implement a Flexible Guidance Software System (FGSS) Configurator to manage data used by aerospace firms with different computer systems in the design, development, and validation of launch vehicle guidance software.

The subcontractor firms are System Development Corp. of Santa Monica, which will assist with computer language compilations, and Computer Sciences Corp. of Los Angeles, which will assist with software configuration control, computer time-sharing techniques, and quality assurance. Both will have personnel assigned to Convair Aerospace-SD's Kearny Mesa plant for work on the Configurator and related studies.

Launch vehicle trajectory programs previously developed on one company's
(Continued on Page 2)

World Will Omit Its July 21 Issue

General Dynamics World will omit the issue that normally would appear July 21 in order to permit staff vacations. Publication will resume Aug. 4.



AIRBORNE — Riggers move 84-ton lower bow section into position for installation on "Doctor Lykes" at Quincy yard.

"Computer"...

(Continued from Page 1)

computer usually could not be transferred to another firm's computer for use without undergoing difficult and costly adaption processes.

Through use of the FGSS Configurator to be developed, aerospace engineers in different cities can simultaneously gather data, develop guidance trajectory models, and prepare and check out flight guidance computer programs with computer compatibility being provided automatically.

As part of the requirements under the Configurator contract, Convair Aerospace-SD and the subcontractor firms will develop a Space Program Language for use in a host computer that will receive and output data for using agencies.

The software system will include control programs to provide desired system response to user commands, processor programs to provide for missile analysis and development of flight programs, and multimission trajectory program libraries which users may use to retrieve existing trajectory programs or add new ones.

John T. Gordon, program director for the FGSS Configurator for Convair Aerospace-SD, said the automated data management concept to be used can compress what heretofore has required months of guidance software preparation for a particular mission into a few hours or days.

"This, of course, will lead to significant savings to the Air Force," he said.

"The trajectory program libraries to be established later as part of the proposed Flexible Guidance Software

System will contain an enormous reservoir of pre-developed data on different types of launch vehicles and trajectories that can minimize the need for 'mission peculiar' software development," Gordon said.

"This will be particularly helpful in providing rapid turnaround and in-flight trajectory changes for future space vehicles such as the Space Shuttle."

Development of the Configurator will be accomplished through use of a CDC 6400 computer at the Kearny Mesa plant. The Configurator then must "close the credibility gap" by performing with a different computer to be selected by the Air Force.

Information from several launch vehicle organizations will be used in development of the Configurator and its Space Program Language.

Gordon, a retired Navy lieutenant commander who formerly served as comptroller for the U.S. Naval Station in San Diego, has been in the launch vehicle guidance and trajectory programming field with Convair Aerospace-SD for 11 years. Programs developed under his direction utilize several different compiler and assembly languages.

As program director for the FGSS Configurator development, he also will serve as chairman of a Program Review Board that will meet weekly to monitor technical progress and help resolve problems that may develop.

Assistant program director is C. H. Gutzler, who recently rejoined Convair Aerospace-SD from the Electro Dynamic Division of General Dynamics. Principal designers most responsible for the design that led to the new contract are Richard Diaddigo, Herbert Hilton, Dorothea Jirauch, and W. F. MacDonald.

Air Force Crew in England Logs 100,000th Flight Hour For F-111s

An Air Force crew from Upper Heyford, England, logged the 100,000th hour of flight for F-111s last month during a routine training mission.

Maj. Hank Hill and Capt. Jon Buntbah of the 20th Tactical Fighter Wing's 77th Tactical Fighter Squadron made the "momentous flight."

Champagne flowed at a brief plane-side ceremony following the flight, and C. W. Cecil, Fort Worth operation director of logistics, and Col. Richard Baughn, 20th TFW commander, presented an F-111 model to the crew and wing.

At Cannon AFB, N.M. the 27th

★ ★ ★

Invest in America and your own future. Buy U.S. Savings Bonds by payroll deduction.

★ ★ ★

"Lykes"...

(Continued from Page 1)

early next year, she is expected to cut turnaround time by at least eight days on round trips between Lykes ports on the Gulf of Mexico and in England and continental Europe.

The carriers' barges (each ship carries 38) are specially designed for use on rivers such as the Mississippi and the Rhine, and canals in the United States, Europe and Great Britain. The barges will be loaded aboard the ship by being floated into the stern well and then lifted to one of the three decks, where self-propelled transporters will move the cargo into storage.

TFW has a "limited number" of F-111E models; however, the outfit will eventually receive "D" models of the F-111.

The 474th TFW at Nellis AFB, Nevada, is comprised mostly of "A" models, with a sprinkling of F-111Es. The 57th's role is to work out combat tactics.

Strategic Air Command has two units of FB-111As: the 340th Bomb Group at Carswell AFB, which has a full complement of bombers; and the 509th Bomb Wing at Pease AFB, N.M. which will soon have a full wing.

FB-111As of the 340th, however, are in the process of being transferred to the 380th Strategic Aerospace Wing at Plattsburgh, N.Y.

The new and more versatile "F" model of the F-111 is slated to start joining a tactical air command unit at Mountain Home AFB, Idaho, later this year.

"Doctor Lykes" and her sister ships, Almeida Lykes and Tillie Lykes, are the first commercial vessels to be built at Quincy since General Dynamics acquired the shipyard in 1964. Each "Seabee" is 875 feet in length. When fully loaded, the ship displaces 51,000 tons. Three decks run unobstructed for the length of each ship.

Miss Ashley Lykes, 17-year-old daughter of Joseph T. Lykes Jr., Chairman of the Board of Lykes Steamship Co., is the sponsor of "Doctor Lykes." Thus, at about 12:30 p.m. on July 10, she will perpetuate tradition by breaking a bottle of champagne across the bow. With that act, though, begins a new tradition of pre-eminence on the seas.



PATCH JOB — F. A. "Mike" Curtis, director 111 engineering project office, displays colorful array of insignia and patches worn by various units and commands that fly the F-111.

Bats and Cats

F-111 Shoulder Patches Reflect Assignments

Bats and cats, black falcons and road runners.

All appear on the insignia, or shoulder patches, worn by members of the 474th Tactical Fighter Wing at Nellis AFB, Nev.

The 474th emblem shows a road runner in high gear, depicting the F-111's low-level supersonic capability.

A black falcon adorns the 429th TFS insignia, while the 430th emblem sports a tiger. A menacing bat is fea-

tured on the 442nd TFS's emblem, representing no doubt the unit's ability to strike at night and in bad weather.

These and many other patches of the units and commands that fly the F-111 belong to F. A. "Mike" Curtis, director 111 engineering project officer at Fort Worth. The handsome collection hangs in his office.

"It started off with some fellows in the field giving me a couple of patches," he said. "Now I collect them to help me keep track of the various units that fly the F-111."

Curtis doesn't own patches from all the F-111 units. But, he's "gaining on it."

In most cases, the using commands conceive and create their own patches. But Fort Worth operation often lends a hand.

John Long, executive assistant in Dept. 207-2, helped the local AFPRO office design its emblem. He also had a hand in designing the "Harvest Reaper" insignia.

Meanwhile, Curtis wants to complete his collection. If you can help, let him know.

General Dynamics World

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Perrine Attends Strategy Talks

C. D. Perrine Jr., Electro Dynamic Division vice president for tactical weapons programs, was one of 33 civilians and 40 admirals and generals participating in recent 23rd annual Global Strategy Discussions sponsored by U.S. Naval War College.

Perrine, a specially invited guest of the Navy, also joined 125 senior reserve officers of the Navy, Marine Corps and Coast Guard attending a two-week active duty training course at the college, Newport, R.I.

The meetings were addressed by Secretary of the Navy John Chafee,

Undersecretary of State John Irwin, Admiral Ralph W. Cousins (VCNO), Senator Jacob Javits, and Dr. Walt W. Rostow. Each gave his views on the meeting theme: "The Changing Balance of Power in Favor of the USSR."

The annual discussions bring together the divergent viewpoints of business, labor, the clergy, the bar, the press, academic community, government and armed forces in an effort to understand the problems facing the U.S. in planning global strategy to attain national objectives.

Two Corporate Level Directors Named, For Advertising, Health and Safety

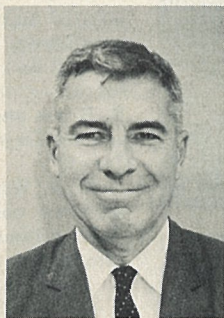
Two appointments were announced recently at St. Louis Headquarters.

Charles L. Crowe has been named Director of Advertising for the Corporation and Dr. Frederick R. Ritzinger has been appointed Director of Health, Safety and Security.

Dr. Ritzinger reports to Algie A. Hendrix, Vice President, and Crowe



Charles Crowe



Dr. Ritzinger

reports to Bob J. Robison, Director of Public Affairs.

Dr. Ritzinger joins the Company after 20 years in the Air Force where his most recent assignment was Di-

rector of Aeromedical Services at Andrews AFB. He took his undergraduate work in chemistry at the University of Washington and holds a MD from the University of Illinois College of Medicine and MPH from Harvard School of Public Health.

Crowe comes to General Dynamics from the St. Louis advertising office of D'Arcy - MacManus - Intermarco where he has been a vice president and group supervisor.

"(He) brings to our organization a wealth of talent and experience," Robison said. "We are delighted to have found a man of his proven abilities to direct our Corporate advertising program."

Crowe joined the advertising firm in 1944 as an office boy when he was 17 and rose to a top level executive position. Active in community and professional affairs, he is a member of the St. Louis Advisory Board of the Salvation Army and recently was elected president of the Advertising Club of Greater St. Louis. He attended Washington University.



YARD TOUR — Hilliard W. Paige, newly named President of General Dynamics (center) toured Quincy Shipbuilding Division recently. He is shown with Richard Meyers, left, assistant to Quincy general manager, and Robert Eddy, director of quality assurance. Paige is no stranger to marine affairs as his father was superintending constructor at Electric Boat while in the U.S. Navy and later worked at EB as civilian until his death in 1940. Paige himself worked at EB four summers during his college years.

People Mobility

Personnel Transfers Within GD

(Following are recent personnel transfers within General Dynamics. In parentheses are dates when individuals joined the company.)

TETSUO MATSUMOTO (1958) from Convair Aerospace-San Diego operation to Electro Dynamic Division-San Diego as senior engineer; ROBERT M. JAMIESON (1963) from ED-Pomona to ED-SD as principal cost estimator; DONALD R. STEWART (1955) from ED-Pomona to Corporate Headquarters; MALCOLM H. HOLLOWAY (1953) from Corporate Headquarters to administrative assistant, Convair-FW; RALPH J. RAINEY JR. (1961) from Convair-SD to senior engineer, ED-SD; THEODORE A. VOGEL (1947) from ED-Pomona to Electric Boat as chief of reliability, maintainability and availability; EMMETT L. WILLIAMS (1946) from Convair-FW to superintendent, Convair-SD; DUANE P. MEALEY (1963) from Convair-SD to ED-SD as senior engineer; CHARLES SHIELDS JR. (1963) from Quincy Shipbuilding Division to program planner, Electric Boat; J. A. RIEGERT (1965) from Convair-FW to Convair-SD as senior quality engineer; REUBEN C. ONSTAD (1952) from Convair-SD to senior engineer, ED-SD; SPIRO C. DANOS (1942) from Convair-SD to ED-SD as project field engineer; FRANK B. McQUEARY (1961) from Convair-FW to Corporate Headquarters; PAUL S. MURRAY (1968) from Quincy to Electric Boat as data system specialist; HERBERT K. MERTEL (1964) from Convair-SD to senior engineer, ED-SD; WILLIS E. MOORE (1963) from Convair-SD to ED-SD as design specialist; FRANK J. KUTZLER (1954) from Corporate Headquarters to Convair-FW as scheduling engineer; FRANCIS M. MILLICAN (1955) from Convair-SD to design specialist, ED-SD; DANIEL KELLEY (1966) from Quincy to Electric Boat as contract change coordinator; ALFRED H. MILLS (1961) from Convair-SD to design specialist, ED-SD; ARTHUR RICHARDS (1950) from ED-SD to Convair-SD.



SEVENTH ANNUAL — Shown during Management Association conference at Fort Worth operation of Convair Aerospace Division are, standing from left: Chuck Simmons, Convair-SD; Arch Rambeau, Corporate Headquarters; Doil Hudson and Bryan Hurphy, FW; Frank Waitkus, Stromberg-Carlson; Tom Edwards, Electric Boat; Jim McGaha, FW; Tom O'Donnell, S-C; John Sposato, EB; Gib von Schmittou, FW. Seated, from left: Carol Lamia, (secretary) FW; Les Stypinski, Quincy; Herb Day, Convair-SD; Lloyd Dorsey and John Baird, Pomona; Wes Magnuson, Convair-SD; Vito Sardo, Electro Dynamic-SD; and Don Slingsby, EB.

Modification Team Wins High Praise For Completing Project Ahead of Schedule

A Fort Worth modification team has earned high praise from the Air Force for finishing an F-111 updating project at Upper Heyford, England, over a month ahead of schedule.

"Quality of work has been exceptionally fine," said Maj. William Head, chief industrial branch USAF, "and no significant problems have been encountered."

"Personal conduct of team members has been commendable, which reflects most highly on team management and supervision."

The 121-man modification team was slated to update some systems on 34 F-111 aircraft of the 20th Tactical Fighter Wing between March 12 and July 21. They completed the job June 18—more than a month ahead of schedule.

Work is continuing on a follow-on contract to modify 13 additional F-111s to the current configuration. This work, too, is proceeding well ahead of schedule.

Fifty of the team members have already returned to Fort Worth, and additional employees will be returning this month.

The modification work was carried out—without overtime—by two shifts. A. O. Hollis was captain of the second-shift group, while Bob Parker headed the first-shift team.

"The task was complicated somewhat by the remoteness of the base," Hollis said. "Our group commuted daily from Coventry, some 35 miles away, while first-shift people stayed in Oxford, about 20 miles away."

"We think our people did a truly outstanding job—and apparently the Air Force does too."

"First F-111F"...

(Continued from Page 1)
delivered at the Waco facility before it was closed.

Net result through June 21: 334 F-111s proof-tested; of these, 270 delivered.

Funds For Naval Expansion Used

An authorization of \$3.3 billion for U.S. naval vessel construction and conversion was recently recommended for fiscal 1972 by the House Armed Services Committee, chaired by Rep. F. Edward Hebert (D-La.).

Over a third of the sum was recommended for the submarine fleet, comprising \$877.5 million for construction of five nuclear attack subs of the SSN-688 class, and \$387.2 million for six Poseidon conversions.

Fort Worth-Built Plane Is Flying Photo Missions to Spot Corn Blight

An RB-57F built at Fort Worth operation is being used to aerial-photograph 45,000 square miles over a seven-state area in an effort to detect corn blight.

The blight has caused damage to corn crops in Ohio, Illinois, Indiana, Missouri, Iowa, Minnesota and Nebraska—the area in which the infrared photos are being taken.

USAF Weather Service is flying the missions for National Aeronautics and Space Administration in the RB-57F—one of several such aircraft built by Fort Worth's special projects group.

"The aircraft has multispectral cameras and other sophisticated sensors capable of detecting heat, optical or magnetic sources," said Vinko Dolson, program director of special projects. "In this case, the diseased plants would generate more heat and theoretically be detectable on the photos."

President Richard Nixon saw the RB-57F in action during a recent visit to Indiana and reportedly was impressed by the effort, Dolson said.

Dolson said the RB-57F could be used extensively in such resources studies to give scientists data about the earth's radiation signals.

The current photography work is actually Phase III of the project called "Corn Blight Watch Experiment." High-altitude infrared and natural

color photography will be done every other week through September.

In the first phase during April, black-and-white photos were taken to orient photo interpreters and field personnel; the second phase in May called for analysis of soil conditions before the corn crops started growing.

VAdm. Land Honored By Marine Academy

VAdm. Emory S. Land (ret.), 92 and a General Dynamics consultant in Washington, was recently honored by the U.S. Merchant Marine Academy, Kings Point, N.Y.

Famous as the World War II Maritime Commission chairman who directed the building of 5,600 ships in four years, the admiral attended a ceremony at which the Academy's Midshipmen Activities Building was rededicated as Land Hall by Andrew E. Gibson, Assistant Secretary of Commerce for Maritime Affairs.

Ready to retire from the Navy in 1937, Land was appointed to the Maritime Commission by President Franklin D. Roosevelt. In 1939 he foresaw the emergency ahead and began the crash program which built the "Bridge of Ships" and made him one of the legendary figures in U.S. Merchant Marine history.



WELCOME HOME — First wave of the modernization team to arrive back in Texas is greeted by A. O. Hollis, a team captain on project.

Log Book Entries

Service Emblems

Service emblems due during the month of July.

Thirty-Five-Year: Dept. 001, Carl B. Reid.

Thirty-Year: Dept. 015, S. Brown, L. K. Lee, F. E. Reed; 027, J. H. Hatchett, R. B. Walling Jr., J. C. Wilson; 081, N. E. Eldridge; 046, J. Berardini, M. A. Cope, W. C. Griffin, C. W. Koskinen, H. A. Stroing; 049, H. G. Blomke; 149, D. S. Arnett, G. D. Kline Jr., M. E. Thomas Jr.; 220, G. Davidson Jr.; 222, C. A. Hagman; 223, R. G. Damschroeder, R. L. Ingraham; 250, O. Browning, C. E. Hendricks, R. F. Missman, N. Thompson, C. White; 400, J. C. Calhoun, W. J. Carpinelli, J. P. Kuswara; 401, J. A. Bottom, W. L. Melichar, C. L. Planchon, H. L. Porter, C. F. Priddy; 460, J. L. Ottoman; 503, J. H. Struthers; 537, A. Van Norman; 731, R. E. Schneider; 761, P. Heisel, C. H. Splinter; 810, W. J. Galpin; 840, J. Cicalo.

Twenty-Five-Year: Dept. 001, C. D. Johnson; 027, J. I. Lockout; 101, Sybil C. Dormier; 148, G. G. Webber; 149, R. G. Goldinger; 221, Juanita G. Henry; 595, L. J. Johnson.

Twenty-Year: Dept. 002, C. E. Flores, D. L. Holloway; 015, D. C. Baillif, W. F. Leverenz, Florence E. Stoike; 019, L. E. Lopez; 027, Oleta J. Anderson; 046, H. Espinoza; 101, S. Weiner; 115, J. R. Bain, H. A. Mitchell Jr.; 130, C. M. Hamel; 149, R. H. Gruner, L. A. Liggett; 195, R. H. Bullock; 222, J. W. Andrew; 250, O. L. Waller; 400, R. A. Cooley Jr.; 460, C. T. Tyree; 503, G. F. Deering; 566, T. F. Hayes; 572, J. Zatarain; 585, R. C. Feller; 700, Emelia J. Skaria; 732, R. L. Roffe; 756, S. J. Elliot; 759, F. Patruno; 761, R. W. Cook, E. J. Oliwa; 834, H. Lesser; 860, Davanna W. Schultz; 962, R. R. Nelsen; 989, J. J. Zorrilla.

Fifteen-Year: Dept. 002, M. L. Wilson; 015, J. N. Soares; 027, Mary L. Labastida, B. Patton; 046, C. Skeens; 101, M. M. Kosmas, A. L. Sloan, H. L. Smith; 115, A. B. Cox; 131, G. G. Millard; 142, C. S. Kikushima, J. J. Molter; 143, H. F. Richards; 144, P. W. Haggard; 148, L. R. Jordan, Elsie M. Keeler; 149, M. L. Atkins; 151, B. L. Ennis, J. V. Seward Jr.; O. J. H. Ward; 191, Charlotte E. Heiminski, Sibyl L. Streep, Virginia H. Vaughn; 193, R. F. Morgner; 195, D. L. Watson; 202, W. Russ Jr.; 221,

Richardson, Mendoza Assume New Posts In Indus. Relations

Appointment of D. M. "Roy" Richardson as chief of labor relations (Dept. 130-7) and of Ray Mendoza as chief of recreation (Dept. 131-7) for Convair Aerospace-SD have been announced by M. V. Wisdom, director of industrial relations.

Richardson reports to Roger Brown, manager of labor relations and compensation. Mendoza replaces George Schmiedel who has resigned. He reports to Wisdom.

Richardson, a graduate of UCLA and of the University of San Diego School of Law, recently passed the spring California bar exam and was admitted to practice in California and federal courts.

He joined Convair's industrial relations department in April, 1968, and has been with its la-



Ray Mendoza D. M. Richardson

bor relations section since that time except for a brief period in professional placement.

Mendoza, a native of San Diego and graduate of California Western University, has been with the Convair Aerospace-SD industrial relations department since 1958.

As an industrial relations representative and employee services supervisor from 1958 to 1965, he helped establish and supervised the Convair Recreation Association's clubhouse and Missile Park complex at Kearny Mesa.

Hours For 'Hams' Change at CRA

A new time schedule and location for sale of Yugoslavian hams by CRA has been announced by Ray Mendoza, chief of recreation. The hams now are on sale from 10 a.m. to 5 p.m. Saturdays and Sundays in the concession stand at Missile Park. They are \$10 each and weigh 10 lbs. 8 oz.

Jean M. Castaneda, J. D. Huddleston, Edna M. Sprague; 222, Lucille F. Aguera; 223, Lorene M. Vanaltenburg; 250, J. Childers, W. R. Hill; 400, T. E. Stark; 401, W. A. Mayhorn; 460, E. Puett; 491, G. D. Lundquist; 511, B. W. Bracka; 516, H. I. Reavely, G. G. Whitford; 517, T. E. Hemphill; 551, E. H. Maurer Jr.; 565, C. C. Perdue; 572, J. W. Horning; 579, W. D. Johnson; 584, P. B. Stephens; 595, J. W. Geanacou; 731, J. J. Monty, C. R. Moon; 733, L. L. Larranaga, E. Portillo; 761, C. M. DeLaBrettonne; 763, A. L. Oldrich Jr.; 832, T. F. Ryan Jr.; 840, Dorothy C. Reed; 950, Yona B. Wiens; 952, G. M. Huston, W. C. Strobl; 954, C. Allen Jr.; 962, W. P. Shine; 967, R. I. Gordon, R. A. Waasted; 979, G. C. Butler, L. D. Chalfant, F. Eggers, D. L. Olson, J. G. Rassel Jr., T. J. Skelley Jr., M. W. Talbert Jr.; 986, R. I. Gordon; 988, A. T. Hunter Jr.

Ten-Year: Dept. 015, W. G. Lewis, W. F. Sager, J. P. Strickland; 019, T. R. Saiz; 046, Edith J. Bayne, C. H. Cline, A. G. Keptner; 101, Margaret L. Buckwalter, W. O. Rock, Darlene F. Sanderson; 105, G. I. Siegel; 130, Patricia L. Simmons; 141, J. V. Davis Jr.; 142, G. E. Whaley; 148, Margarete E. Davis; 151, R. E. August; 204, A. E. Pumala; 210, Evelyn H. Smith; 220, E. C. Walley; 221, Mary L. Arestad; 400, C. W. Rolfe; 618, A. Rivas; 524, Constance R. Danner, Beverly J. Traver; 533, R. A. Bithell; 584, R. D. Bradshaw; 585, R. Gieseke; 593, H. W. Holmes, M. E. Roberts; 962, H. R. Jewett Jr.; 968, R. L. Pleasant; 967, R. N. Roth; 979, C. J. Dennis, H. S. Maynard; 986, L. C. Engbreghof, S. W. Matthews; 989, R. L. Broxholme, E. J. Freno, W. L. Weston.

ELECTRO DYNAMIC

Thirty-Year: Dept. 566, E. G. McCleave Jr., C. F. Ratcliffe.

Twenty-Five-Year: Dept. 619, E. F. DeMers.

Twenty-Year: Dept. 106, D. DeCrescenzo; 444, Virginia A. Newlin; 445, R. J. Blommer; 614, A. E. Bittner, M. Ishihara; 635, R. D. Foster; 652, D. K. Hall; 711, D. H. Roll.

Fifteen-Year: Dept. 102, L. M. Whitney; 391, P. C. Jordan; 423, Ella I. Kovacs; 426, C. E. Brown; 447, C. A. Nelius, N. M. Skow; 449, Dorothy M. Carey, Angelina M. Raymond; 523, W. J. Creamer; 525, E. V. Mitchell; 614, F. V. Knight Jr.; 619, S. C. Maki; 635, B. A. Rees; 638, D. E. Herbert; 651, D. B. Dewey Jr.; 652, K. N. Jones; 712, H. L. Eddy; 716, D. V. Norgaard; 814, J. C. Dobyne, G. S. Fletcher, J. Gallan Jr.; 922, D. Q. Stewart; 923, G. Garcia, Emma H. Stevens; 924, L. C. Dunn.

Ten-Year: Dept. 105, Q. E. Clem; 391, P. Arellano; 423, Evelyn J. Lombardo; 449, L. M. Hogboom, Loraine C. McElroy; 525, Anna M. O'Dey; 612, P. H. Buckingham; 716, R. A. Sievers; 814, R. J. Rainey Jr.; 923, J. Doyle.

Retirements

CONVAIR

BASTRUP—Kay L., Dept. 511-3. Seniority date June 20, 1966, retired June 20.

CASTILLO—Tommie O., Dept. 780-6. Seniority date Oct. 27, 1958, retired May 24.

CHADWELL—Malcolm H., Dept. 148-2. Seniority date March 9, 1956, retired June 30.

CLARKSON—Earl T., Dept. 143-1. Seniority date May 1, 1956, retired June 30.

DAVIS—Raymond L., Dept. 985-1. Seniority date April 21, 1959, retired April 16.

DOIG—John, Dept. 105-0. Seniority date Dec. 16, 1935, retired June 30.

FOWLES—Joseph E., Dept. 131-1. Seniority date April 25, 1960, retired June 30.

GREEL—Frank W., Dept. 250-1. Seniority date Dec. 1, 1950, retired June 25.

HAZLEWOOD—Robert G., Dept. 145-1. Seniority date March 7, 1960, retired June 30.

JENKINS—J. Hood, Dept. 223-3. Seniority date Dec. 5, 1952, retired June 30.

KIRINICH—Andrew, Dept. 780-0. Seniority date Nov. 2, 1959, retired June 8.

NELSON—Charles W., Dept. 802-0. Seniority date Feb. 27, 1962, retired May 28.

READY—John T. Jr., Dept. 514-3. Seniority date April 2, 1943, retired June 4.

ROBINSON—Edward D., Dept. 046-0. Seniority date Oct. 10, 1935, retired June 18.

SKINNER—Douglas M., Dept. 250-2. Seniority date Oct. 25, 1951, retired June 30.

SMITH—Margaret S., Dept. 170-9. Seniority date March 4, 1947, retired June 25.

STULL—Richard F., Dept. 403-1. Seniority date June 18, 1962, retired June 23.

THOMAS—Paul E., Dept. 045-0. Seniority date Oct. 21, 1946, retired May 28.

TYLER—Percy R., Dept. 572-4. Seniority date July 1, 1947, retired June 30.

WISE—Melvin L., Dept. 250-2. Seniority date June 8, 1950, retired June 30.

Personals

CONVAIR

We wish to thank our many Convair friends for their kind expressions of sympathy and the beautiful wreaths received upon the death of our father Jesus Lopez.

M. M. Lopez, Dept. 045
Rebecca Castro, Dept. 046
* * *

Words cannot express the thanks we have in our hearts for all the thoughtfulness and kindness you have shown to us during our time of sorrow.

Mrs. Marshall Stoughton,
Donna, Marsha, Lonna, and Cyndi
* * *

We wish to extend our thanks and appreciation for the many floral tributes and generous donations to the Heart Fund given in memory of our beloved wife, mother, and sister, Esther A. Buckley.

Family and Relatives
* * *

The family of Anthony Olive wishes to thank you for your generous contributions in our moments of sorrow.

* * *

We would like to express our appreciation for the contributions and expressions of sympathy shown by our friends upon the death of our son and husband, Rodger.

Mr. and Mrs. Leonard Hake
and Janice
Mrs. Christina Hake and Jennifer



GROUP AWARDS—Electro Dynamic-SD Zero Defects group award banners were presented recently to product design Dept. 711 (top photo) and electronics production and electronics research development Depts. 444 and 445 (lower photo). Receiving congratulations from W. E. Bratton, vice president and general manager, were I. F. Thomson, supervisor of design services, for Dept. 711 and Jay Farrar, manager of launch vehicle programs electronics operations, for Depts. 444 and 445. Both groups were cited for significant reduction of errors. Candy and cigars were distributed after ceremonies.

First Fuselage Sections Delivered For DC-10-20 Long Range Jetliner

Convair Aerospace Division's San Diego operation last week delivered the first fuselage sections for McDonnell Douglas DC-10-20 long-range jetliner.

The big C-D and F-G sections were flown from the Convair Aerospace-SD Lindbergh Field plant in San Diego to the Douglas plant in Long Beach in two flights aboard Aero Spacelines' whale-size Super Guppy cargo plane.

The DC-10-20 will have a gross weight of 550,000 pounds—120,000 more than the DC-10-10's previously assembled—and will use Pratt and Whitney engines. A later -30 version also for long-range use will use up-rated General Electric engines.

Northwest Airlines will fly the first of the -20 series liners in which the sections delivered last week will be incorporated.

"Because of the usual problems associated with a first-of-a-kind article and some late changes, delivery of the two sections last week instead of in July as previously forecast required a 'supreme effort' by our assembly department and support functions," M. C. Curtis, vice president and general manager, said. "Our customer people at Douglas were pleased with our effort and the results."

Convair Aerospace-SD had previously delivered 25 complete three-section fuselage sets for the -10 series aircraft, including one set for use as a test article, plus two additional -10 sections. First delivery of sections for the -30 series aircraft is scheduled in November.

McDonnell Douglas has announced plans to deliver its first DC-10-10 tri-jetliners to United

and American Airlines in combined ceremonies July 29 at the Long Beach plant.

Mgt. Assn. Twin Bill Begins at 6 p.m.

Employees who have purchased tickets for the Convair Management Association and CRA-sponsored baseball outing Friday (July 9) at San Diego stadium are reminded that the event has been rescheduled to a double-header between the San Diego Padres and Chicago Cubs with the first game starting at 6 p.m.

A free drawing for a \$500 vacation trip will be conducted between games.

Paul Green, event coordinator, said a few employees who purchased tickets before June 16 at the employee benefits office at Lindbergh Field were given both sections of their ticket for the drawing by mistake. The large section should be returned.

BIKE CLUB PLANS TOUR

The CRA Bicycle Club has planned a 25-mile tour of Point Loma and Mission Bay July 17 with Dick Gilbert, ext. 1267 LF, as ride leader. Bob Williams, ext. 1626 KM, will head the 10-mile Balboa Park ride scheduled July 25.

ETR LINKSMEN PLAN TOURNEY

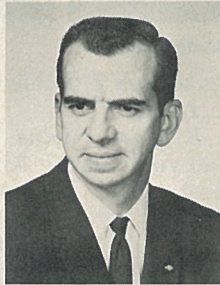
CRA's Golf Club at the Eastern Test Range has scheduled a tournament July 17 at John's Island to be followed by a family beach party.

Jones Transferred To San Diego Post

Jerry R. Jones, manager of industrial engineering and production scheduling at Fort Worth for the past two years, has been appointed director of industrial engineering and master scheduling (Dept. 202-0) for Convair Aerospace Division's San Diego operation. He reports directly to M. C. Curtis, vice president and general manager.

W. L. White has been appointed manager of methods and manpower, reporting to Jones. He will be responsible for manufacturing methods functions. W. R. Bruce and program plans and control Dept. 203 also report to Jones.

W. E. Wise, manager of plant services, continues to report to J. M. Adamson, director of operations. The plant services organ-



Jerry Jones

ization will include plant engineering, office services, and air-lift operations.

Jones joined the Fort Worth operation in 1948 in the assembly department and held a number of positions including manufacturing control general supervisor, and chief of manufacturing control.

C. C. Brewer Named LVP Sales Manager

Clifton C. Brewer, manager of the General Dynamics Los Angeles field office since 1969, has returned to Convair Aerospace Division's San Diego operation as sales manager for launch vehicle programs.

He reports to Ed Hopley, director of marketing, and has sales responsibility for Atlas, Centaur, Orbital Vehicle 1, Or-



Clifton Brewer

bit-to-Orbit Shuttle, and Versatile Upper Stage programs in addition to pursuit of other new-business opportunities.

Brewer, a graduate of the University of Idaho, first joined General Dynamics at Pomona in 1952 and was transferred to the former Astronautics Division in 1955.

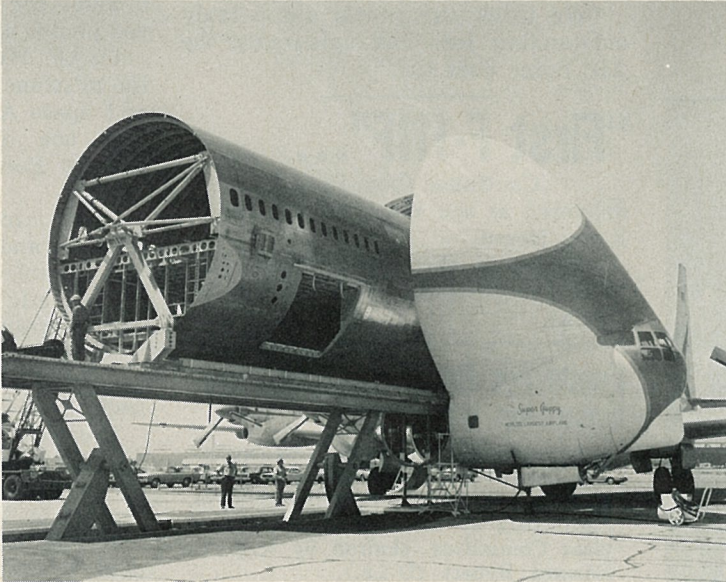
He was the first Atlas missile program representative assigned to work with the Air Force at Vandenberg AFB (then Camp Cooke and later Cooke AFB) and helped supervise build-up for launch of the first Atlas D and E-series missiles there.

Brewer was assigned to General Dynamics' Washington office in 1967 and served there as manager of the Ballistic Missile and Space Systems Group for two years before being transferred to the Los Angeles field office.

Bob Nicholas' Catch Leads Delta Divers

Roy Rogel's team regained first-place standing in CRA Delta Divers' third competition dive of the year—a spearfishing contest June 20 at Solana Beach.

Bob Nicholas took first place by spearing three bass and opal-eye weighing about 13 pounds, which put him in the lead in "diver of the year" standings. Runners-up are Jack Read, Hal Reese, and Cliff Kickbush.



SECTION SENDOFF—Fuselage C-D section for first long-range DC-10-20 tri-jetliner is loaded aboard Super Guppy at Convair Aerospace-SD Lindbergh Field plant for delivery to McDonnell Douglas. The first of the new long-range craft will be for delivery to Northwest Airlines.



GLOBAL GREETING—Bob Montague of Convair Aerospace-SD looks over message that went around world in $\frac{3}{4}$ -second through INTELSAT satellites. Original is at top left and returned message at lower right.

Speedy Delivery

Message Circles Globe in Under a Second

Bob Montague, chief of motion pictures and TV for Convair Aerospace Division's San Diego operation, recently received a hand-written message from Geneva, Switzerland, that had gone completely around the world in less than a second through INTELSAT satellites over the Atlantic, Pacific and Indian oceans.

The message from Allan Galfund, senior information officer for Communications Satellite Corp. (COMSAT) in Geneva, was literally received while it was still being transmitted at an INTELSAT exhibit at TELECOM '71 in Geneva.

Both the original and the message received came to Montague

later via regular mail in an envelope with four Swiss stamps of a special issue commemorating the new INTELSAT IV series of satellites being launched by Convair Aerospace-SD Atlas-Centaur launch vehicles.

The message to Montague said simply "Greetings from TELECOM '71. This message has traveled around the world via satellite in $\frac{3}{4}$ of a second. Best regards. Allan Galfund."

The message came to Montague as a result of Convair Aerospace and COMSAT discussions on a film that may be produced to describe INTELSAT's worldwide communications capabilities.

The first of the INTELSAT IV satellites, launched with "spectacular precision" by Atlas-Centaur 25 early this year, has been providing commercial service over the Atlantic since March 26.

Suggestion Earns An Award of \$3,500

Barbara Dill, an engineering release data recorder in Convair Aerospace-SD's Dept. 565-1 at Lindbergh Field, has been awarded \$3,500.80 for an Employee Suggestion that will save the division 10 times that amount by eliminating some unnecessary engineering drawing reproduction, distribution, and filing.

An award check for \$2,975 was presented last month by W. W. Fox, representing the vice president-research and engineering, and she previously had received a "partial payment" award for \$525 representing 10 per cent of the saving to be accrued on her job alone.

Under Miss Dill's suggestion, F-111 engineering drawings arriving from Fort Worth operation now are filed in the engineering blueprint files but are not reproduced and distributed unless a Task Control Record (TCR) is initiated.

As a result, the drawings received are always available for reference but reproduction and distribution is involved only when a definite need exists.



TRIP TICKET—Barbara Dill of Convair Aerospace-SD's Dept. 565-1 receives \$3,500 Employee Suggestion Award check and related certificate from W. W. Fox as F. D. Applegate, director of product design, looks on. She plans a trip to Hawaii!

CRA Calendar

(For information on CRA activities call CRA headquarters, ext. 1111 KM. Deadline for next issue of the World is July 27. Call ext. 1071 LF or 3322 KM. All meetings are held in the CRA Clubhouse unless otherwise noted.)

★ ★ ★
ADVENTURERS—Meeting 7:30 p.m., July 21.

BADMINTON—Call Al Van Norman, 222-4867, for information.

BICYCLE CLUB—Point Loma/Mission Bay 25-mile ride, July 17. Balboa Park 10-mile tour, July 25. Call Bob Williams, ext. 1626 KM, for information.

BRIDGE—Duplicate bridge sessions, 7:30 p.m. each Friday.

CAMERA CLUB—Meeting 7:30 p.m., July 18, Photo Arts Bldg., Balboa Park.

CERAMICS—Meet 9 a.m.-noon and 7:30 p.m., Tuesdays and Thursdays.

CHORUS—Rehearsals 7:30 p.m. each Monday.

COINERS—Meet 7:30 p.m., July 12.

COUNTRY & WESTERN MUSIC—Meet 7:30 p.m., Thursdays.

DELTA DIVERS—Scavenger hunt July 17 at La Jolla Cove. Meeting 7:30 p.m., July 14.

FISHING CLUB—Pottuck 6:30 p.m., meeting 7:30, July 20, Gillespie Field Clubhouse.

GOLF—Tecolote 3-club tourney, July 17-18, 6:30 a.m. tee-off. ETR tourney, July 17 at John's Island.

GUN CLUB—Fun shoot, 9 a.m., July 25, Gillespie Field gun range.

HEALTH CLUB—Open 9:30 a.m.-10 p.m., Monday through Thursday; 9:30 a.m.-9 p.m., Fridays; 9 a.m.-noon, Saturdays; "women only" weekdays, 9:30-11 a.m.

HI-FI MUSIC—Meet 7:30 p.m., July 13.

ICE SKATING—GD family skate night 6:15-7:45 p.m. each Thursday, House of Ice, Interstate 8 and Lake Murray Blvd. Flat rate fee \$1 (includes skates).

MINIATURE RAILROAD—Operating sessions Saturdays, Sundays, and holidays, CRA Missile Park.

MODEL HO RAILROAD—Work sessions 7 p.m., each Tuesday, CRA Missile Park.

PISTOL CLUB—Shoot 9:15 a.m., July 11 and 25, Police Pistol Range, Federal Blvd. & Home Ave.

RADIO CLUB—Meeting 7:30 p.m., July 15.

RETIRES—Luncheon meeting 11:30 a.m., July 13.

RIDING CLUB—Fun show, Aug. 15, Missile Park riding ring. Meeting 7:30 p.m. July 14.

RIFLE CLUB—Senior shoot 7 p.m. July 14 & 28; junior shoot 9 a.m. July 17.

ROADRUNNERS—Meet 7:30 p.m. July 22, Gillespie Field Clubhouse.

ROCKHOUNDS—Meeting 7:30 p.m. July 7.

SAILING—Meet 7:30 p.m. July 28.

SCULPTURE—Workshop sessions 7:30 p.m. each Monday.

SKI CLUB—Water skiing each Wednesday, 5 p.m., Crown Point landing. Meeting 7:30 p.m. Aug. 3, South Bay Club recreation room.

SPORTS CAR CLUB—Meeting 7:30 p.m. July 14.

SQUARE DANCE—Dance 8-10 p.m. Thursdays.

STAMP CLUB—Meeting 7:30 p.m. July 8 and 22.

SWIMMING—Family swim night 7-9 p.m., July 17, Mission Beach Plunge, tickets at employee benefits, 5 cents.

TOASTMASTERS—Convair Toastmasters meet 4:30 p.m. each Wednesday. Dynamic Toastmasters meet 5:30 p.m. Thursdays.

TRAILERS—Meet 7:30 p.m. Aug. 3.

TROPICAL FISH—Meeting and workshop 7:30 p.m. July 19.

WOMEN'S GOLF—Fletcher Hills tourney, July 10, 9 a.m. tee-off.

Margaret Clark Wins Women's Golf Award

General Dynamics linkswomen have scheduled a July 10 tourney at Fletcher Hills with tee-off time set for 9 a.m.

Margaret Clark won the Ernie Paul Memorial Trophy with low gross score 73 in the annual tourney held last month over the Mission Bay links. In handicapped play, Joan Sjoblom was first in Flight A with low net 67 and Charlotte Young took Flight B honors with net 54.

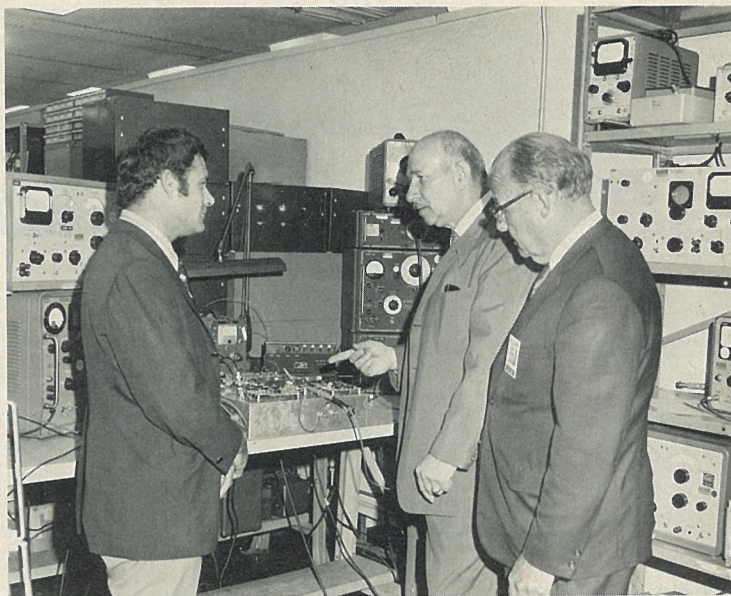
For information on club activities call Doris Parker, ext. 2883 LF or Jeannine Letzring, ext. 3136 KM.

Annual Family Picnic Scheduled For Aug. 15

The annual Convair Aerospace-SD all-employees' family picnic has been scheduled Aug. 15 at Missile Park by the two sponsoring organizations, Convair Management Association and Convair Recreation Association.

"This year's picnic will be even bigger and better than last year's—and at an even lower price," said Bob Ratliff of the Management Association.

Tickets will be \$1 for adults and 75 cents for children under 10 and will cover the lunch, contests, rides, stage shows, prizes, and drawings for the younger set.



BRIEFING—Schlomo Barr, left, Electro Dynamic sales representative in Israel, looks over "breadboard" for new FOR (Family of Radios) pack set in radio communications lab at Lindbergh Field plant during visit to San Diego. At right are John Savo, Electro Dynamic-SD communications laboratory chief engineer, and T. J. Kelly, director of international marketing.

Electro Dynamic Representative in Israel Visits San Diego for Product Briefing

Schlomo Barr, sales representative in Israel for selected Electro Dynamic Division products for the past year, visited San Diego recently for a briefing on Electro Dynamic-SD and Stromberg DatagraphiX products.

He previously had met with J. W. DiSimone, manager of international market development, at Corporate Headquarters and visited Electro Dynamic's Dynatronics operation in Orlando.

Barr is one of three engineers who own and manage STG International Ltd. in Tel-Aviv, an organization specializing in military equipment, systems, and components. The firm also represents several other major U.S. industrial firms in Israel.

While in San Diego, Barr was hosted by T. J. Kelly, director of international marketing for Electro Dynamic-SD, and Fred

Walz, manager of international marketing for DatagraphiX.

He was briefed on Electro Dynamic-SD radio systems and interactive graphics and large-screen display systems and on DatagraphiX Micromation recorders, printers, and viewers.

"The visit has far exceeded my expectations," he said. "I have learned a great deal and also have had an opportunity to get to know some of the people behind the letters."

Barr has handled marketing and sale of Electro Dynamic radio equipment to the Israeli Navy and arranged for field testing of transceivers and antennas in that country.

He said use of computers is increasing at a rapid rate in Israel and believes future opportunities for DatagraphiX products there are excellent.



VOLLEY VICTORS—Pencil Pushers team displays trophies received for winning CRA volleyball league championship. From left are (standing) John Chew, Jerry Dame, and Bill Lutes, and (kneeling) Jeff DeVore, Don Sudweeks, and Jack Slone.

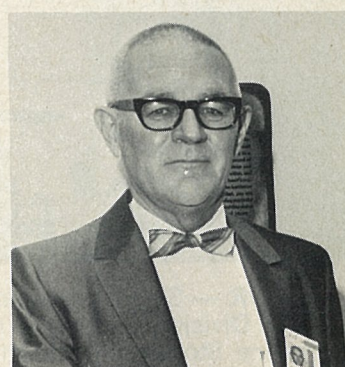
'Pencil Pushers' Take Tourney Title In CRA Volleyball Competition

Pencil Pushers who proved their proficiency at pushing volleyballs over the net in Municipal Gym in Balboa Park were awarded trophies and luncheon tickets last week as champs in the CRA plant volleyball league.

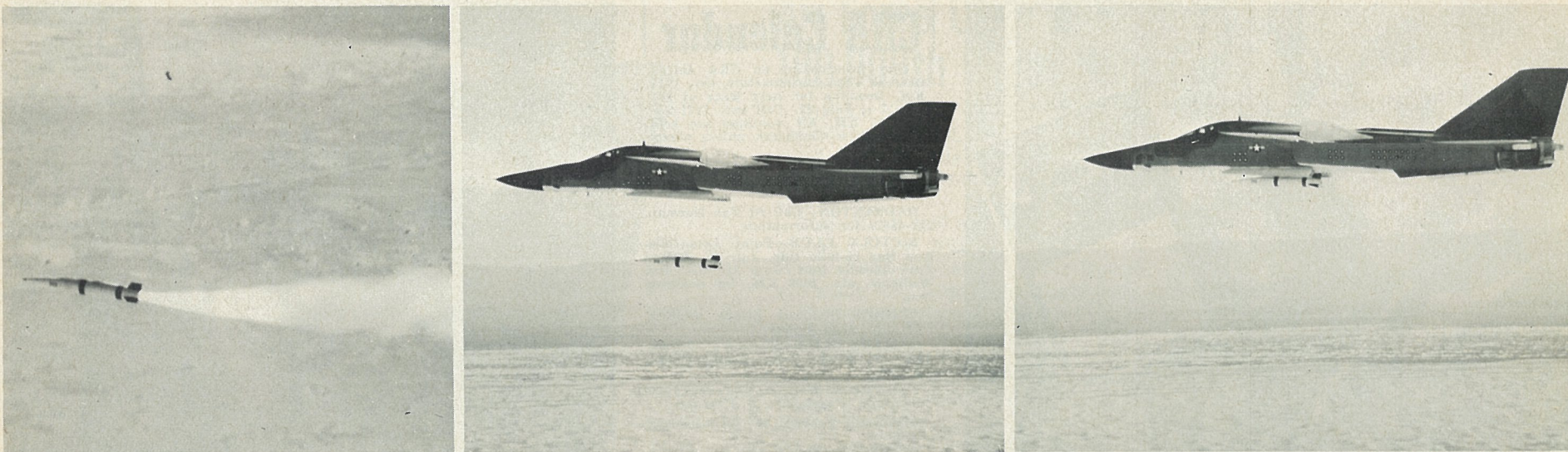
Five of the six men on the championship team—Jeff DeVore (captain), Don Sudweeks, Jack Slone, Bill Lutes, and John Chew—work for Convair Aerospace-SD on the D-1 Centaur computer controlled launch set. The other, Jerry Dame, is from Electro Dynamic-SD's Dept. 614.

Both the Pencil Pushers and the Remainders remained in the statistics book with six wins and one loss at the end of the season after seven Wednesday nights of play. The Pencil Pushers then eliminated the Remainders in two straight games,

15-12 and 15-10, in the playoffs for the league title.



THIRTY-FIVE-YEARS—William G. Kilgore Jr., Dept. 820-0, recently received 35-year service pin.



LOW-LEVEL LAUNCH—Crew of Lt. Cols. Ollie Mims, pilot and Charles Wright, systems operator, recently completed successful supersonic, low-level launches of a SRAM (short-range attack missile) over White Sands

Missile Range. In above sequence of a subsonic launch, SRAM separates from FB-111A No. 5; then rocket engine ignites, propelling missile toward target.

Supersonic Launches of SRAM Completed at White Sands

An Air Force crew recently completed two successful supersonic launches of a SRAM (short-range attack missile) over White Sands Missile Range in FB-111A No. 5.

The first drop was made at Mach 1.2 and 1,000 feet at a low side-target. The other drop was made at the same speed at 10,000 feet at a high side-target.

"We met all test objectives," said Major John Stratford, director of the AFPRO joint test force, which

is conducting the Category II SRAM operation.

As on previous Category II missions, Lt. Col. Ollie Mims was pilot, Lt. Col. Charles Wright systems operator.

Major Stratford said four more launches—including two low-level sorties—would complete Category II testing, probably in July.

Category III testing of SRAM will be carried out by Strategic Air Command crews at a later date.

★ ★ ★

FB-111A Mission Successful With First SRAM 'Full House'

An Air Force crew successfully carried out the first "full house" launch of short-range attack missiles (SRAMs) recently over White Sands Missile Range, N.M.

Equipped with five SRAMs—two under each wing and one in the weapons bay—FB-111A No. 5 was used to carry out the mission at Mach 1.6 and 40,000 feet.

Only one actual launch was made; the outboard SRAM on the aircraft's right wing was fired at a side target. The other drops were simulated, with the missiles launched—and scored—electronically.

"All five missiles had to be 'launched' within a specified time period," reported Lt. Cols. Charles Wright and Ollie Mims, crewmen. "We met this requirement and in addition had excellent strike results."

The launch was the sixth in a series of Category II missions being carried out by the Air Force at Fort Worth operation. Previous launches were made in an envelope from Mach 1.2 at 1,000 feet to Mach 1.6 at 40,000 feet—and several points in between.

Two more Category II drops are scheduled: one mission at Mach .9 and 250 feet; another at Mach .9 and 35,000 feet. After these missions, Air Force will start Category III demon-

strations of SRAM.

"So far," said Colonel Wright, "the Category II program is going beautifully. The SRAM and FB-111A are compatible. They make a very effective weapon system."

More F-111Es Cross Atlantic to England

Delivery of four more F-111Es to the 20th Tactical Fighter Wing at Upper Heyford, England, last month gave the unit a full complement of variable-wing fighters.

Each of the 20th's tactical fighter squadrons—the 77th, 79th and 55th—now has 24 aircraft.

The 20th will also be furnished with seven command support F-111Es, two of which have already been delivered. Other support aircraft are to be delivered this month.

Meanwhile, members of the 79th TFS participated in the annual NATO Tiger Meet at Upper Heyford last month.

Nine squadrons from seven countries met for "comprehensive week-long operational programs." Airmen from the United States, England, Canada, France, Belgium, Germany and Italy attended.



"5 ON 5"—FB-111A No. 5, with five short-range attack missiles (SRAMs) aboard—two under each wing and one in weapons bay—prepares to make "multiple launch" over White Sands Missile Range, N.M. SRAM at extreme left was actually launched; electronic "launches" were made on other four missiles.

Fleet Ballistic Missile Submarines Spend 'Century and Half' Under Seas

The 41 fleet ballistic missile submarines of the U.S. Navy have spent "approximately a century and a half" of submerged time on patrol, says VAdm. Eugene P. Wilkinson, who as Commander Submarine Force, U.S. Atlantic Fleet, has 35 of the FBM's under his command.

The admiral was speaking June 4 at a press briefing at Submarine Flo-

tilla Two headquarters at the Sub Base, Groton, Conn., prior to the launching of Silversides, the Navy's 100th nuclear submarine, at Electric Boat Division.

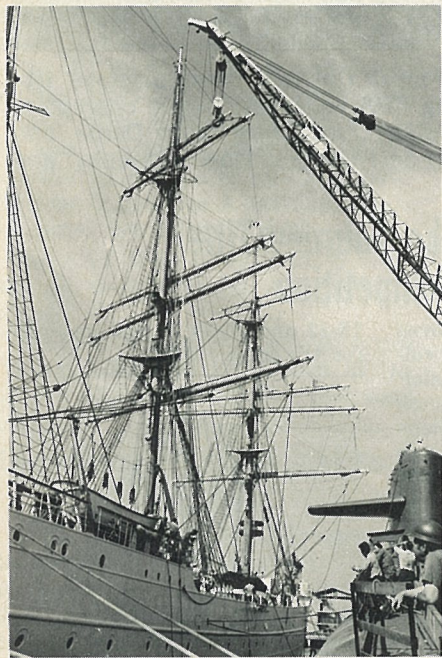
"Of the 41 FBM submarines," Adm. Wilkinson said, "six are assigned to the Pacific Fleet and conduct their patrols from Guam. The other 35 are Atlantic Fleet assets. One squadron each conducts patrols from Holy Loch, Scotland, and Rota, Spain. The remainder operate out of Charleston, S.C."

The ships and crews, the admiral said, have conducted "approximately 900" patrols in the more than ten years of the FBM fleet's existence. "Polaris and now Poseidon are constantly on station, ready, and will remain a credible, survivable, deterrent system through this decade and into the 80s," he pointed out.

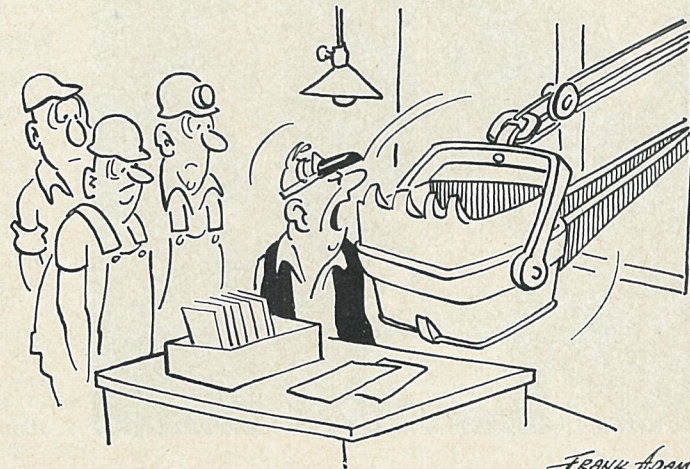
Under the Navy's present plans, 31 of the 41 FBM subs are being converted from Polaris missiles to fire the more advanced Poseidon. The first Poseidon sub, James Madison, converted at Electric Boat, began her first patrol March 31. A total of seven Poseidon conversions are currently under contract to the division.

VAdm. Harold E. Shear, Director of the Antisubmarine Warfare Program for the Chief of Naval Operations, and VAdm. Philip A. Beshany, Deputy Chief of Naval Operations for Submarines, also participated in the briefing, attended by some 50 news representatives.

Invest in America and your own future. Buy U.S. Savings Bonds by payroll deduction.



VISITOR—Shipbuilders at Electric Boat Division, at work on nuclear submarine Stonewall Jackson, did a fast double-take last weekend when an old-time windjammer tied up alongside. It was U.S. Coast Guard bark Eagle, visiting the Groton shipyard for foremast repairs.



"You fellows will have to come in and pick up your pay checks like everybody else!"

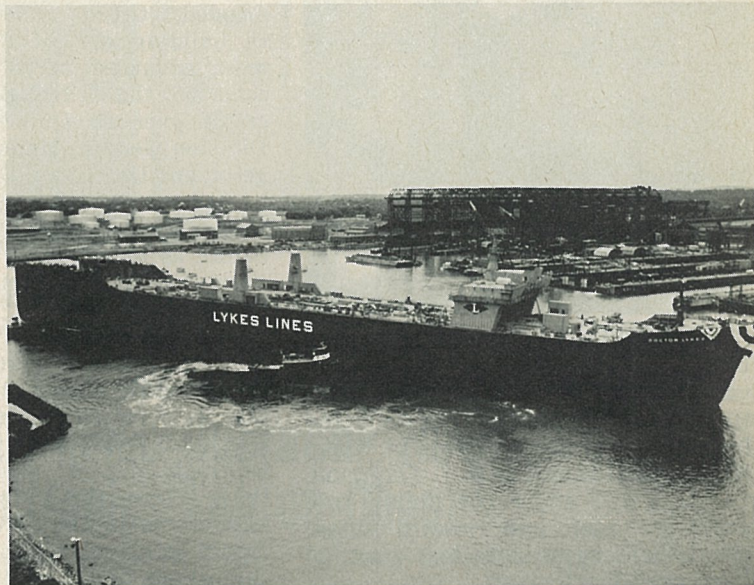
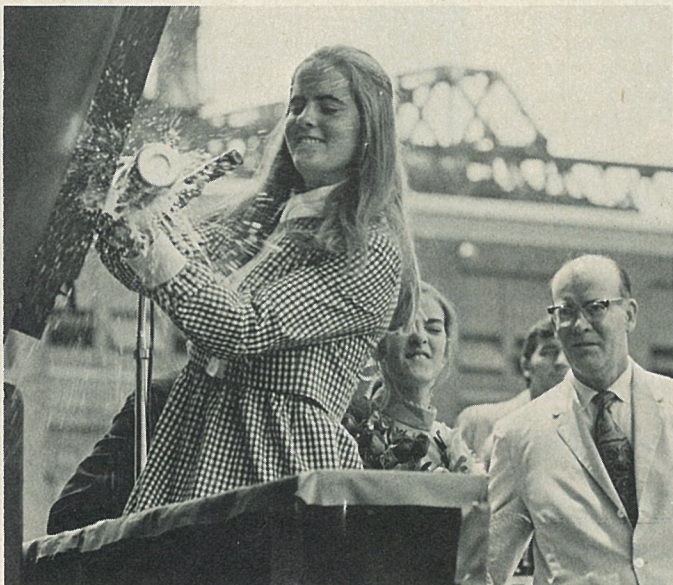
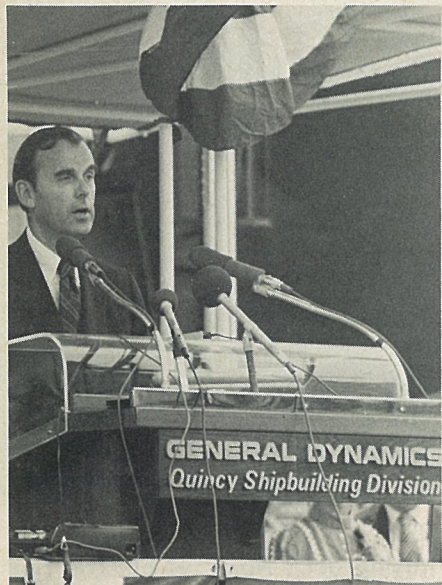
General Dynamics World

Vol. 1, No. 4

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August 4, 1971



SPLASH!—In center photo Miss Ashley Lykes christens "Doctor Lykes" in traditional manner while her father, Joseph T. Lykes Jr., observes. At

left, Andrew E. Gibson, Assistant Secretary of Commerce, delivers key address at Quincy Shipbuilding Division.

'Highly Successful' SRAM Launch Climaxes Joint Test Operation

The seventh and final Category II launch of a SRAM (short-range attack missile) recently completed a "highly successful" joint test operation.

"Air Force, Boeing Company and Fort Worth operation personnel worked smoothly as a team to complete the assignment," said Maj. John Stratford, Air Force test director.

(Continued on Page 2)

Cold Proof-Testing Of More F-111s OK'd

Fort Worth operation has received Air Force go-ahead to cold proof-test 111 additional F-111 aircraft—50 F-111D models and 61 F-111Fs.

The new authorization brings to 460 the total number of F-111s slated for the cold proof-test program.

Through July 23, a total of 341 F-111s had been cold proof-tested at Fort Worth, Waco and Sacramento Air Materiel Area.

'Doctor Lykes' Called Symbol Of New Merchant Marine

"One of the most unique and outstanding cargo ships ever constructed anywhere in the world," was the way Andrew E. Gibson, Assistant Secretary of Commerce for Maritime Affairs, described S. S. "Doctor Lykes," christened July 10 at Quincy Shipbuilding Division.

Secretary Gibson was principal speaker at the ceremonies for the 875-foot long ship, largest dry cargo carrier in the world. "Doctor Lykes," first of a new merchant class known as "Seabees," is one of three identical craft being built by General Dynamics for Lykes Bros. Steamship Co., Inc., of New Orleans. The "Seabee" system features a revolutionary self-contained stern elevator, which allows fast loading and unloading of cargo away from congested terminals. Specially designed barges can be floated over the submerged elevator, which can then lift up to 2,000 tons of cargo at a time to any of three decks, from which transporters emerge to move the cargo into stowage.

Miss Ashley Lykes, 17-year-old daughter of Joseph T. Lykes Jr., Lykes Bros. chairman, sponsored "Doctor Lykes," breaking the traditional bottle of champagne across the bow of the 51,000-ton-displacement ship.

In his remarks, Secretary Gibson said that "Doctor Lykes" "In every way symbolizes our resurging Merchant Marine. It will make its full contribution to the seapower so vital to our nation's welfare.

"This vessel, along with her sister ships, will provide this nation with a military sealife capability in time of emergency that is unmatched by any other class of commercial cargo ships or comparable military vessel yet designed.

"The flexibility of the 'Seabee' design is such," Gibson noted, "that with no structural modifications the ships can be adapted into full or partial containerhips or roll-on/roll-off vehicle carriers."

The secretary said the ships' wide range of capability is of great significance to those in the Department of Defense concerned with logistic support of our military forces. "Cargo can be discharged in six hours at a pier," he said, "and self-propelled barges could accomplish offshore discharge. Helicopters could also be used to fly cargo on and off from the upper deck.

"The exceptional capabilities of the 'Seabee' carriers to provide efficient transport of commercial cargo in time of peace, and serve as a military auxiliary in a national emergency, attest to the unique design of 'Doctor Lykes'

and her sister ships," Gibson summarized.

Gibson paid tribute in his address to the team involved in the "Seabee" program. He singled out Frank A. Nemec, president of both Lykes Steamship Co. and its corporate parent Lykes-Youngstown Corp., for his development of the "Seabee" concept.

"It is a bold departure from conventional ship designs," Gibson said. "Frank Nemec and his management deserve full credit for conceiving an

(Continued on Page 2)

Contract Awarded For STOL Studies

An Air Force contract to examine three potential short takeoff and landing (STOL) military transport aircraft lift-propulsion concepts has been won by Convair Aerospace Division's San Diego operation.

The \$1,500,000 program—under the direction of the Flight Dynamics Laboratory of the Air Force Systems Command—is an 18-month investigation which includes studies, analyses, and wind tunnel tests. Joseph Hebert of Dept. 583-0 is program manager.

The three potential STOL lift-pro-

(Continued on Page 3)



GREETINGS—Cdr. L. D. Nace, commanding officer of missile submarine USS Kamehameha, is greeted by Joseph D. Pierce, general manager, and William G. Atkinson, overhaul program manager, at Electric Boat Division. Occasion was arrival July 12 of Kamehameha for conversion to Poseidon missile capability.

First Two DC-10 Tri-Jetliners Delivered to American, United

The first two McDonnell Douglas DC-10 tri-jetliners with 20-foot-wide fuselages built by Convair Aerospace Division's San Diego operation were delivered to American and United Air Line's executives in special ceremonies last Thursday in Long Beach, Calif.

General Dynamics was represented by Frank W. Davis, President of Convair Aerospace Division.

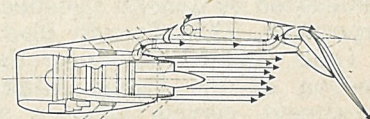
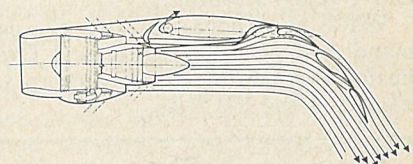
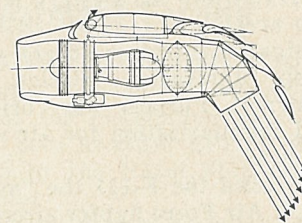
The two DC-10s, painted in their respective airline markings, were positioned nose-to-nose, forming a V-shaped backdrop for the joint first deliveries.

James S. McDonnell, Chairman of the Board of McDonnell Douglas, handed gold keys to the DC-10s to Marion Sadler, Vice Chairman of American, and Edward E. Carlson, President of United.

The flight crews and 16 stewardesses — eight from each airline — marched from the transports to accept the keys from Sadler and Carlson. At the conclusion of the ceremony, the crews taxied the new tri-jets to the adjacent Long Beach Municipal Airport.

"Good neighbor" characteristics of low sound levels and smokelessness were demonstrated by the planes as they climbed quickly skyward and headed for their respective bases.

American and United will use the DC-10s initially for crew training before introducing the transports into commercial service later this month. Nineteen airlines in the U.S., Europe, Africa, and New Zealand have placed orders.



STUDY CONCEPTS — Artist's drawings, top to bottom, illustrate vectored-thrust plus mechanical flap system; externally-blown flap system; and internally-blown flap system.



DELIVERY — Second F-102 Delta Dagger interceptor for use by Convair Aerospace-SD in aircraft structural integrity program is delivered by Col. Kenneth Nordling of Idaho Air National Guard to B. F. Ferguson, center, F-102 and F-106 deputy program manager, and Howard Auten, left, chief engineering test pilot, at Lindbergh Field plant.

F-102A Arrives 'Home' For Fatigue Testing

The second F-102A interceptor to be used by Convair Aerospace-SD in the aircraft structural integrity program (ASIP) cyclic fatigue testing was flown "home" to the Lindbergh Field plant last month by Col. Kenneth Nordling, commander of the 124th Fighter Group of the Idaho Air National Guard.

B. F. Ferguson, F-102 and F-106 deputy program manager, said the F-102A was delivered originally in 1956 to the 327th Fighter Interceptor Squadron at George AFB, Calif., the first squadron to operate F-102s for the Air Defense Command.

It later saw service with the 14th Fighter Group at Ethan Allen AFB, Vt., and the 496th Fighter Interceptor Squadron at Hahn AB, Germany, before being assigned to the Idaho Air National Guard unit in Boise.

Now, after almost 15 years of service and 3,192 hours in the air, the delta-winged "bird" will be used in extensive tests that may permit others of its kind to have their certified flying "life" extended from 4,000 to 7,000 hours.

F-111Es Visit Greece On Training Flight

Four F-111Es from the 20th Tactical Fighter Wing in Upper Heyford, England, recently completed a training flight to Athens, Greece, the U.S. Air Force in Europe reported.

USAFE said this was "the first flight of the Air Force's NATO-committed F-111Es into the Eastern Mediterranean area."

The navigational training flight was a non-stop, unrefueled mission to Athenai airport. Purpose was "orientation and familiarization for air and ground crews."

USAFE called the F-111 the "most modern U.S. Air Force fighter aircraft . . . the latest addition to the USAFE and NATO inventory."

While at Athenai airport, the commander of the 7206th Support Group hosted a group of Greek visitors who inspected the F-111Es.

General Dynamics World

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"Lykes"...

(Continued from Page 1)
innovative transportation system."
He also complimented the design agent, J. J. Henry Company of New York, whose staff translated the "Seabee" concept into the working plans and specifications for constructing the sophisticated vessels.

"General Dynamics is to be commended," Gibson added, "for its role in building one of the largest and most advanced cargo ships ever to come off the drawing board. Special credit goes to Quincy Shipbuilding Division General Manager Lloyd Bergeson and the tremendous contribution he has made in providing the leadership to successfully produce the ship before us today. He is truly the manager of what I predict will be a pennant-winning team."

In his introductory remarks, Bergeson said, "There were many doubts that we could launch this ship on time, that we could successfully operate the transporter/elevator system, or that we could deliver 'Doctor Lykes' on time. We are launching on time, we have operated the elevator with her own power, and we shall deliver this ship ahead of her contract date."

Additional remarks were given by David S. Lewis, Chairman and Chief Executive Officer of General Dynamics.

In his remarks, Lewis pointed out this ship's significance to the Armed Forces and to the Merchant Marine. He said "She has special meaning for our Armed Forces who may find the need to apply her unique and flexible cargo capability and speed to support this country's world wide commitments. And, she has special meaning for our Merchant Marine. The 'Doctor Lykes' will revitalize our Merchant Marine service to help the U.S. regain its competitive edge in world markets."

Hilliard W. Paige, recently elected President of the Corporation, was introduced to the audience.

Among the more than 800 guests witnessing the christening were members of the U.S. Congress, including Senators Ellender (Louisiana) and Taft (Ohio) and Representatives Boggs (Louisiana), Keith and Burke (both of Mass.) Other guests included executives of Lykes Bros. and other shipping companies, and representatives of the U.S. Maritime Administration, Military Sealift Command, and American Bureau of Shipping. Two thousand shipyard employees and their families also looked on.

Immediately following the christening "Doctor Lykes" was floated out of her building basin and moved to an adjacent pier where final outfitting and testing will be conducted.

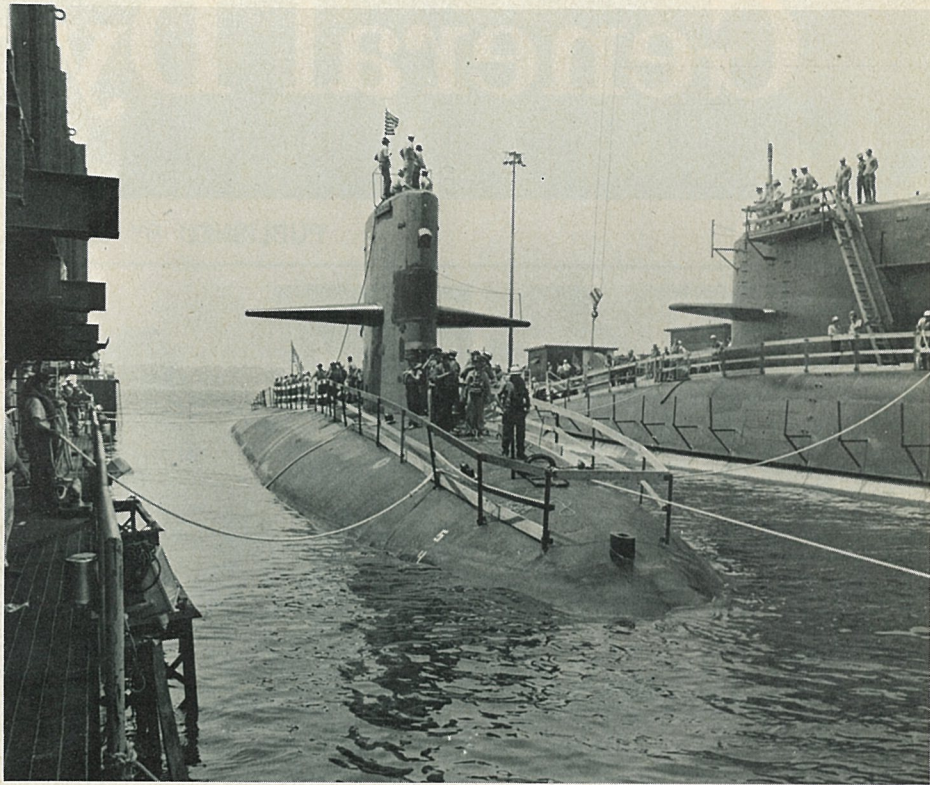
The ship will enter service early next year, plying routes between Lykes ports on the Gulf of Mexico, England and continental Europe. Since the elevator permits fast loading and unloading away from congested terminals, turnaround time on round trips is expected to be cut by at least eight days.

The barges are specially designed for use on rivers such as the Mississippi and the Rhine and canals in the United States, Europe and Great Britain.

Invest in America and your own future. Buy U.S. Savings Bonds by payroll deduction.

Quality Control Panel Will Convene at EB

Electric Boat Division will be host for this year's second bi-annual meeting of the General Dynamics Procurement Quality Control Committee Aug. 19-20. William T. Agerter, chief of nuclear quality control engineering, and Charles S. Wilkinson, chief of procurement quality control, will be the host division's delegates, with Frederick A. Pellerin, nuclear quality control engineering, and William Shipman, procurement quality control, in charge of arrangements. About two



TWO IN ONE — USS Pargo enters graving dock No. 2 at Electric Boat Division, watched by workers and crew members of USS Kamehameha (background). Pargo's arrival marks first time graving dock has been used to start overhaul work on two vessels simultaneously. Pargo is at the shipyard for overhaul and refueling, while Kamehameha will be converted to Poseidon missile capability. The Navy has announced award of a \$12.7 million contract to Electric Boat to overhaul Pargo.

Electric Boat Names Robert Secor To Coordinate Environment Control

A new position, chief of environmental control, to insure that operations of the company protect the health of its employes or the surrounding community, has been established at the Electric Boat Division.

In making the announcement, Joseph D. Pierce, general manager, said that Robert H. Secor of research and development, a certified marine chemist, will fill the post.

"Control of manufacturing processes and practices, proper disposal of wastes and by-products and good housekeeping are essential," Pierce said, "if we are to control the environment and prevent pollution of the atmosphere and the nation's waters."

In his new assignment, Secor is responsible for identifying, evaluating and ensuring control of potential health hazards in the industrial environment within the division. In carrying out



Robert Secor

his responsibilities, he coordinates with Harold J. Morgan, chief of fire and safety; A. Duncan MacDougall, medical director; Thomas H. Keel, radiological control manager, and the cognizant supervisors in operations, engineering and other departments.

Secor, a Marine Corps veteran, is a graduate of Providence College and attended graduate school at the University of Rhode Island where he studied chemical oceanography.

Commenting on his new job Secor said, "we keep tabs on the Thames River as well as the atmosphere in all

parts of the plant, both outdoors and in enclosed work spaces, including submarines under construction or overhaul. We have already tracked down a couple of instances of river pollution. We look forward to a constant effort to keep environmental problems under control, in cooperation with our neighbors."

"SRAM"...

(Continued from Page 1)

SRAM is a supersonic air-to-air missile slated for service on FB-111A and B-52 bombers, and ultimately the B-1.

The missile is designed to penetrate sophisticated enemy defenses and can be launched at targets located forward of the aircraft, to either side of the aircraft, or even directly behind the aircraft.

During 19 "live" Category I and II launches from FB-111A No. 5, SRAMs were successfully fired at targets in all these positions. Launches were made at both subsonic and supersonic speeds, at altitudes ranging from on-the-deck to over 40,000 feet.

On one of the final missions, FB-111A No. 5 made a multiple launch of five SRAMs in rapid succession at separate targets. One of the five SRAMs was actually launched; the others were launched electronically.

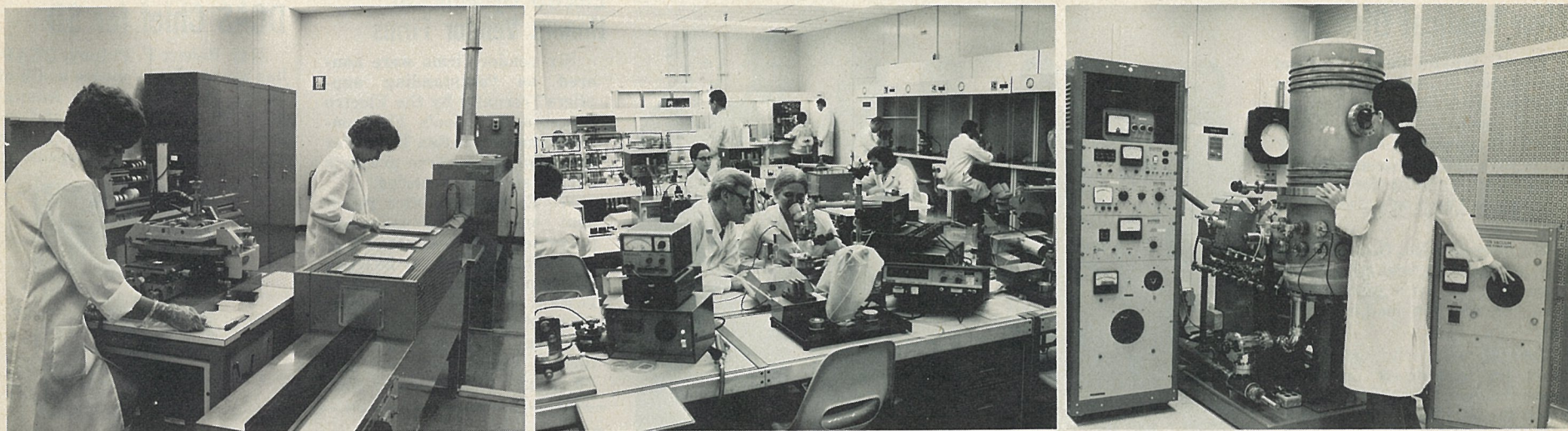
Boeing built the SRAMs and certain airborne equipment for the FB-111. Fort Worth worked with Boeing to check out FB-111 No. 5, maintain the aircraft, provide Category I flight crews and reduce the airborne data.

The Boeing-Fort Worth Test Center monitored tests from a control center in the Electronics Building. Center personnel had direct visual and verbal communications with various "SRAM offices" across the nation. The center opened over three years ago and will close Aug. 31.

"This was one of the more successful integrated flight-test programs conducted for Strategic Air Command," said D. B. Webendorfer, Boeing center manager.

Fort Worth flight crews carried out over 83 flights in various F-111A aircraft with dummy SRAMs before the first live launch. These missions were to check out flutter and weapons-separation characteristics, guidance and navigation systems, and other aircraft and missile systems."

Jim Graham, FB-111A/SRAM flight test director, lauded the joint effort as "a highly successful program all the way around."



LABORATORY LOOK—Views show Electro Dynamic Division's new microelectronics laboratory in San Diego and one of its many "mini-size" products. From left, Josephine Holley and Olivia Bell use screen printer and furnace in printing of thick-film circuit patterns for Dynatronics operation;

hybrid-circuit assembly area with equipment for probing and trimming, wire bonding, and high-reliability NASA circuit assembly; Joyce Gilliam operates ultra-high-vacuum system to evaporate thin-film materials onto ceramic substrates in horizontal-laminar-flow super-clean room.

First F-111D With Mark II Heads For 'Cold-Soak' at Eglin

The first F-111D equipped with a Mark II avionics system headed for a "cold-soak" at Eglin AFB, Fla., last month, following its final acceptance flight by the Air Force.

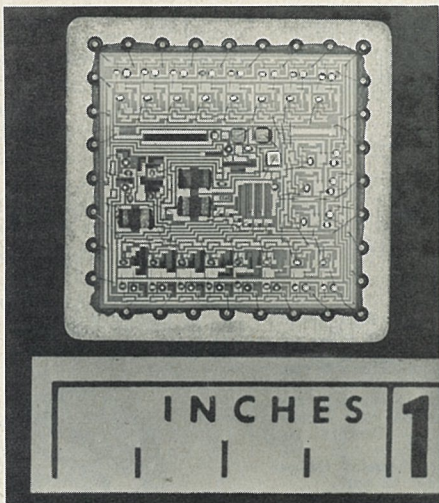
In this test, the aircraft is being subjected to sustained well-below-freezing temperatures to see how the airplane and avionics systems function in extremely cold weather.

Meanwhile, Category II performance tests on F-111D No. 1—which is not equipped with a Mark II system—continues at Edwards AFB, Calif.

"Performance tests are routinely carried out on new models because of configuration changes," said Bob Moller, manager of flight test. "Primary change in the D model is in the new 'triple-plow II' inlet."

The E model is equipped with the same type inlet, so the performance tests on F-111D No. 1 will suffice for both the D and E models, except for engines, Moller pointed out.

Prototype testing of the Mark II system continues on F-111A aircraft Nos. 27 and 28.



TINY—Digital-to-analog converter with 201 components shown in one-inch square package.

John Scanlon Elected To National Office

John F. Scanlon, manager of industrial accounting for Convair Aerospace-SD, has been elected a national director of the National Association of Accountants. He has been with General Dynamics since 1950 and is a past president of the San Diego NAA chapter.

Electro Dynamic Operating New Microelectronics Lab on Coast

Electro Dynamic Division is operating a new 7,000-square-foot microelectronics laboratory in Bldg. 33 at the Kearny Mesa plant in San Diego for the design, fabrication, and test of prototype and medium-quantity hybrid microelectronic circuits for use in varied company and customer programs.

Peter Bauer, manager, said the facility is equipped with all state-of-the-art equipment needed for use in engineering prototype design and product development work.

It represents a consolidation of selected equipment and personnel from microelectronics laboratories formerly operated by the Electronics Division in Rochester, N.Y., Electro Dynamic's Electronics operation at the Lindbergh Field plant in San Diego, and the former Convair Division at the Kearny Mesa plant.

Integrated hybrid microcircuits are produced by both thin-film and thick-film techniques, primarily employing nichrome and gold for thin-film cir-

cuits and palladium and gold for thick-film circuits. Ultrasonic, thermo-compression, and eutectic bonding techniques are used to interconnect active and passive components.

Most of the circuits developed are designed to meet stringent NASA and military specifications. Quality assurance is maintained over each processing technique and product, and the facility's manufacturing personnel have passed special certification tests to verify their capability for the tasks they perform.

The microelectronics advanced technology programs intend to provide across-the-board improvement in manufacturing processes and to extend General Dynamics' capability into new areas. Particular emphasis is being placed on increased circuit density, improved trimming techniques, and improved methods of selection and attachment of beam-lead, flip-chip, and other leadless inverted devices. Development and standardization of packaging techniques also is an on-going process.

The new facility has 34 employees of whom 17 are manufacturing operators. Ken Brown is manufacturing supervisor, Nick Tafvelin is engineering supervisor, and Rolf Linden is test supervisor.

Hybrid microcircuits are being produced in the facility for Electro Dynamic's Electronics and Dynatronics operations, Stromberg Datagraphix, Convair Aerospace operations, and the University of California at San Diego for use in Army, Navy, NASA, and commercial product lines.

"Contract"...

(Continued from Page 1)

pulsion concepts to be examined are mechanical flaps with vectored thrust, externally-blown flaps, and internally-blown flaps.

The first concept uses a high-lift system to generate lift which is then augmented by turning the cruise engine thrust downward. The externally-blown flap concept utilizes high-bypass-ratio turbofan flow impinging on a trailing edge flap which deflects and diverts flow downward and through the flaps to create substantial increases in lift. Bleed air from cruise engines is used in the internally-blown flap concept to supply air flow which is diverted over the upper surface on the flap to create sufficient lift for STOL operation.

"This is a key technology study leading to possible development of the next Air Force tactical transport, currently identified as the medium USAF STOL tactical transport," Hebert said. "The medium STOL transport is intended to replace the C-130."

The contract was one of three awarded in this STOL technology program. While Convair Aerospace will examine all three of the lift-propulsion concepts, the Boeing Co. will concentrate on internally-blown flaps and mechanical flaps with vectored thrust and North American Rockwell will study externally-blown flaps.

"The purpose of this Air Force program is to develop a technology base upon which to build evaluation criteria to aid in the future selection of an Air Force STOL tactical transport," Hebert said.

Others with key roles in the program and their areas of responsibility include J. C. Ramsey, aerodynamics; E. C. Laudeman, stabilization and control; G. F. Campbell, dynamics and simulation; and W. D. Reeder, wind tunnel tests.

EB Awarded Contract For Compact Waste Treatment Facility

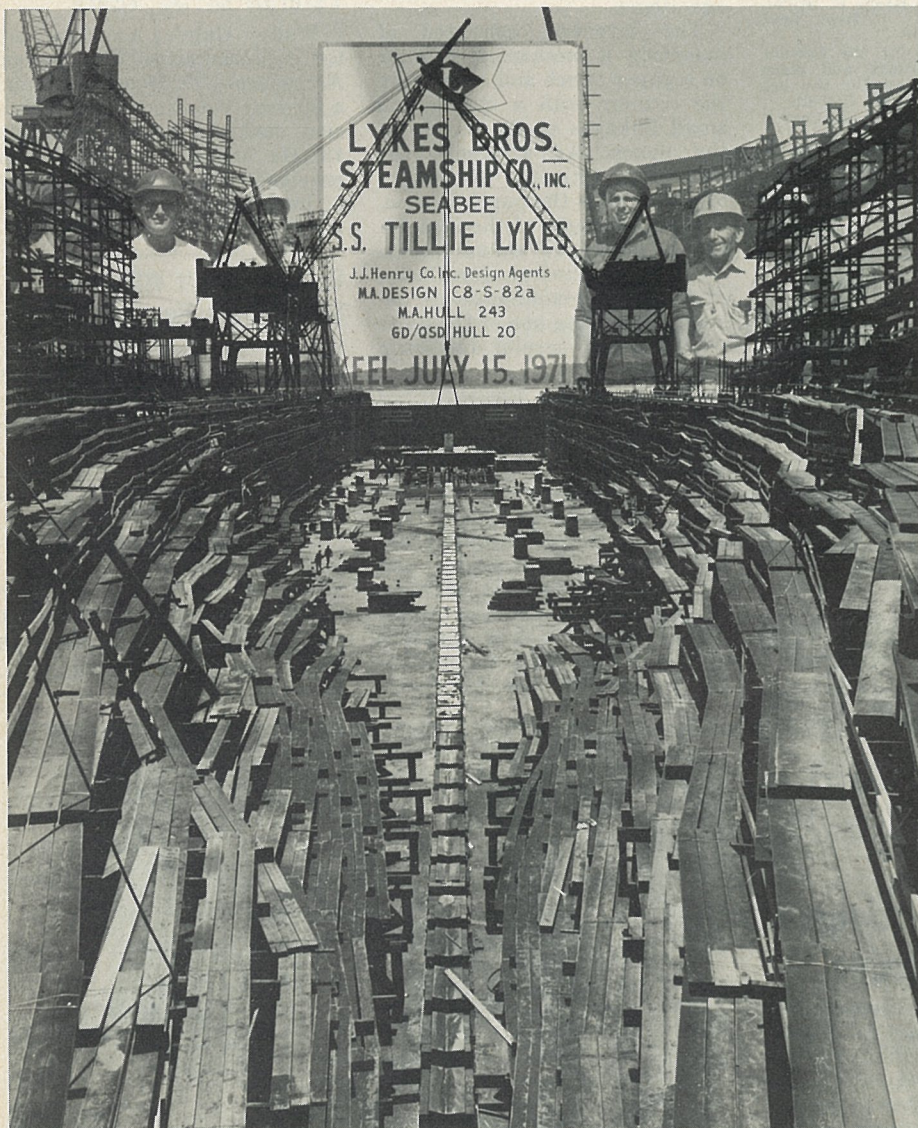
A \$588,600 contract to develop and design a compact waste treatment plant for installation on Navy ships has been awarded Electric Boat Division by the Naval Ship Engineering Center.

The system will combine two existing methods of sewerage treatment—bacterial absorption and microscopic filtration.

Harold Wallman of New London, director of the program and chief of chemical and environmental engineering at Electric Boat Division, said that the effluent to be discharged by the unit should be cleaner than that from most municipal secondary treatment plants. He said the effluent should be pure enough to be reused in the ship's sanitary facilities.

Navy plans call for the unit to be fully developed and tested before being installed on ships having crews of 40 or more. It will be designed into new ships and ships already in the fleet will be refitted.

As prime contractor, General Dynamics has over-all design responsibility, with filtration units and other process technology subcontracted to Dorr-Oliver, Inc., Stamford, Conn.



STUDY IN SYMMETRY—Keel for "Tillie Lykes," third "Seabee" under construction at Quincy Shipbuilding Division, was laid July 15, only five days after Doctor Lykes christening and in the same basin occupied by Doctor Lykes before her floatout. Photographer Paul Prescott produced this interesting composite, in which wide-angle lens gives impression of a vast stadium, while the 120.5-ton keel unit rests at the far end. He portrayed human element by superimposing basin shot over negative of group of shipbuilders next to keel unit marker.

Dr. Powell, AF Retired, New Medical Director

Dr. G. Wayne Powell, retired Air Force colonel and former chief of preventive and occupational medicine for the Office of the Surgeon General at USAF Headquarters, has been appointed medical director for Convair Aerospace Division's San Diego operation.

He succeeds Dr. G. M. Clarke who retired last week after more than 14 years as a plant physician and division medical director.

Dr. Powell, who graduated from the University of Michigan, received his M.D. degree from the University of Buffalo, N.Y., in 1946 and his master's in public health from UC Berkeley in 1950.

While deputy surgeon for the 8th Air Force at Carswell AFB, Texas, he worked with company personnel on human factors en-



G. W. Powell, M.D.

gineering for the B-58. Much of his flight time of more than 2,000 hours has been in B-36s.

As chief of preventive and occupational medicine at USAF Headquarters for the past two years, he has been responsible for formulating related USAF policies and providing worldwide guidance.

Dr. Powell is a Fellow of the American College of Physicians and a Diplomate of the American Board of Preventive Medicine and a member of several other professional societies.

'Ten-Strike' Slated To Cut DC-10 Costs

"Ten-Strike," a methods improvement program to reduce DC-10 fuselage manufacturing cost, has been initiated in Convair Aerospace-SD assembly departments at the Lindbergh Field plant.

The program, using illustrations on a bowling theme, has a goal of each foreman implementing a Ten-Strike Improvement each month for a year and is aimed primarily at reducing labor cost for assembly of the tri-jetliner fuselages.

Jack Hurt, DC-10 program manager, said the special program has been set up to "define cost reduction targets and help assure and monitor achievement of the targets."

About 100 foremen attended a recent meeting in which Bluch W. Kahla of Dept. 202-5, Ten-Strike coordinator, outlined objectives.

"We're looking for truly 'hard-dollar' savings," Kahla said. "Having a goal of a Ten-Strike Improvement each month will encourage each foreman to look for ways to improve production and reduce cost. Each general foreman will have a Ten-Strike Program score card to show the number of improvements implemented by each of his foremen."

"Each foreman has been reminded of his responsibility as a manager and has been asked to analyze each operation in his area to determine how improvements can be made," Kahla said. "The foreman and his employees are in the best position to know where improvements can be made to reduce cost."

Kahla, a General Dynamics employee for 22 years, recently returned to Convair Aerospace-SD from Quincy Shipbuilding Division where he was manager of management engineering. He previously had served at Corporate Headquarters, Stromberg-Carlson, and the San Diego and Fort Worth divisions.



RECOGNITION — W. E. Bratton, left, Electro Dynamic Electronics operation vice president and general manager, and Col. Charles F. Merz, right, commander of the Defense Contract Administration Services Region-SD, participated in ceremony in which supplier firms were honored for defect-free products. Recipients, from left, are James Ahl of Delevan, Richard Scully of Courtesy Manufacturing Co., Ken Burton of Allen-Bradley, J. Russ Webb of U.S. Capacitor Corp., and Ken Holloway of Motorola.

Log Book Entries

Service Emblems

Service emblems due between Aug. 1 and Aug. 15.

CONVAIR

Thirty-Five-Year: Dept. 400, Frank L. Kany.

Thirty-Year: Dept. 031, W. Arends; 046, W. C. Burgess, H. L. Wade; 195, W. Vierra; 203, H. L. Henrie; 250, H. L. Teague; 572, N. J. Kinnischtzke.

Twenty-Five-Year: Dept. 149, E. M. Grace; 202, T. F. McCubbin Jr.; 400, C. P. O'Carroll; 401, D. A. Prentice, R. M. Shuck; 512, W. H. Byam; 565, F. M. Boley.

Twenty-Year: Dept. 130, B. H. Diefenbaugh; 131, C. B. Scully; 142, E. J. Hazer; 196, R. E. Bunnerson; 221, Margaret L. Burke; 223, Eva M. Christensen; 250, W. F. Van Dusen Jr.; 400, W. C. Dallman, J. D. Rose Jr.; 401, R. Lang; 512, J. D. Hask Jr.; 759, R. E. Orozco, O. Valdez; 834, J. C. Christian; 840, D. B. Courtois; 956, Elnora L. March; 988, R. F. Summers.

Fifteen-Year: Dept. 046, O. A. Martinez; 130, H. J. Albright Jr.; 141, G. J. Williams; 143, R. S. Killgore; 145, W. E. Tipton; 193, Patricia R. Jacobsen; 196, F. S. McCullough; 203, A. H. Wolfson; 204, F. P. Cook; 220, Adeline K. Stevens; 221, Anne Mattsen; 400, J. E. Fleming; 507, C. R. Olden, R. R. Varney; 551, M. T. Raaberg; 553, R. W. Wood; 572, C. J. Kropp; 596, C. N. Abeyta Jr.; 733, M. A. Thomas; 761, R. M. Sailer; 763, A. F. Hyland; 953, L. B. Gilmore; 967, J. Saugier, G. B. Wood; 979, H. S. Elliott, J. J. LaPalme, J. A. Matthews, B. F. Willoughby; 985, G. N. Vick Sr.; 986, F. B. Anthony Jr., R. P. Day, A. L. Gensette.

Ten-Year: Dept. 046, E. M. Rosas; 130, Kathleen E. Freeman; 191, Edith A. Matlack; 221, G. Ritchie; 250, P. P. Howie, A. L. Romano; 401, A. J. Dadisman; 460, H. W. Spencer; 595, Lillian E. Armfield; 954, E. F. Brown, Phyllis J. Gonzales; 966, P. B. Bunch; 979, W. N. Heath, R. W. Sather, R. L. Westfall.

ELECTRO DYNAMIC

Twenty-Five-Year: Dept. 205, Evelyn C. Johnson.

Twenty-Year: Dept. 422, R. H. Pierce; 556, J. G. Kowalsky.

Fifteen-Year: Dept. 103, Helen E. Black; 526, Lillie Pearl Jones; 636, T. P. Young; 652, T. J. Nilson; 814, J. S. Sorensen.

Ten-Year: Dept. 109, P. H. Teeter; 565, S. Frankel; 614, A. J. Mason; 638, Helgi Heinzmann; 712, C. A. Wallace; 813, J. G. Manells.

Personals

CONVAIR

The family of Shirley Ann Gunn gratefully acknowledges your kind expressions of sympathy.

Phil and Vance Walsh

Luella and I wish to extend our thanks to our friends for their thoughtfulness and the flowers received during my illness.

Los Angeles Office
Clem Ohiser
Dept. 144-3

Words cannot express the appreciation we have in our hearts for the expressions of sympathy and contributions of our friends and members of the Con-Trib-Club upon the deaths of our two sons, Henry and Allen Firestone.

Firestone Family
and relatives

The family of Murray Edelstein most gratefully acknowledges and deeply appreciates the kind expressions of sympathy from all of his friends and associates at General Dynamics.

Bertha (Butch) Edelstein

Your kind expression of sympathy is deeply appreciated and gratefully acknowledged by the family of Kenneth Dale Ostermeyer.

I wish to thank my many friends for their flowers, cards and many phone messages during my recent pre and post-operative recuperation time.

Helen R. Miller,
Dept. 149-7

My sincere thanks for the flowers, Heart Fund contributions and many expressions of sympathy for the loss of my husband, Philip W. Corbett.

Helen E. Corbett

I wish to thank the many friends, fellow employees and the Management Club for the flowers and cards of sympathy for my beloved husband Charles Ryan.

Mrs. Ruby Ryan

The family of Bob Rustad acknowledges with grateful appreciation your kind expression of sympathy.

Mitzi Rustad

Words cannot express our thanks for the thoughtfulness and kindness you have shown to us during our time of sorrow.

Jean Benton
and family

Rider-Driver

CONVAIR

RIDE WANTED—From Pepper Dr., El Cajon to Lindbergh Field plant, 8 a.m. to 4:30 p.m. shift. Call Lezlie Spraker, ext. 2107 LF or (home) 449-1563.

Deaths

CONVAIR

GALPIN—Walter, Dept. 810-1, died July 13; survivors include his wife, Pauline, and three daughters—Susan, Donna, and Myrna.

JACOBI—Julius L., Dept. 999-0, died July 2; survivors include his wife, Roylenn, and two daughters, Patricia Moon and Janet Ware.

PISCATELLO—Anthony, Dept. 015, died July 14. Survivors include his wife, Anne, son, John Edward and granddaughter, Robin Anne.

RUSTAD—Robert T., Dept. 999-0, died July 7; survivors include his wife, Mitsuko; a daughter, Sharon; and two sons, Dale and Craig.

John Catone Winner In Safety Drawing

John Catone, a radiographer in Convair Aerospace-SD's Dept. 141-4 at Air Force Plant 19, won a pair of safety shoes in a recent drawing conducted by the San Diego operation's safety section.

It was the second consecutive month for a function under Don Miller, chief of process control-quality engineering, to place first in the Convair Aerospace-SD safety performance evaluation contest and qualify for the drawing.

Electro Dynamic-SD Honors Vendor Firms

Six vendor firms were honored as "outstanding suppliers" recently by the Electro Dynamic Division's Electronics operation in San Diego for providing defect-free products over a six-month period.

W. E. Bratton, vice president and general manager, presented engraved plaques to representatives of the Delevan Division of American Precision Industries, U.S. Capacitor Corp., Motorola Semiconductor Products, Courtesy Manufacturing Co., Jones Machine Shop, and Allen-Bradley Co.

Seven Earn Degrees From Texas Institute

Seven General Dynamics men—six from Convair Aerospace-SD and one from Electro Dynamic-SD—were among 17 San Diegans awarded Bachelor of Technology degrees with a major in safety engineering by Texas State Technical Institute in ceremonies June 26 in the Kona Kai Club.

Degree recipients from Convair Aerospace-SD were Oscar Bell, Len Breen, Al Gates, Bob Tilton, Wayne Turner, and Dick Schulz. Leroy Atkinson of Electro Dynamic-SD was the other GD grad.



Material Liaison Man Gets Patent

John Walsh, a material liaison man in Convair Aerospace-SD's Dept. 833-1 who retired this month after more than 31 years with the company, was issued a U.S. patent July 6 for combining two simple devices that can be used to simplify inventory of certain types of stock and storage items.

The invention consisted of mounting a mechanical counter on a paper punch and connecting the counter with a spring and small linkages to the handle of the punch. As a result, the counter is activated automatically each time the punch is used.

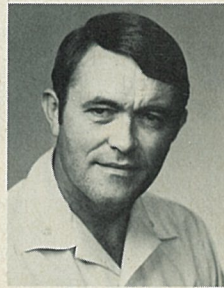
Walsh thought of the idea for use in taking an annual inventory of gas cylinders. Jim Duffy, chief of tool manufacturing, assisted in putting one of the units together from surplus and scrap materials.

"It's so simple, I'm surprised it apparently has taken so long for someone to think of it," Walsh said.

At the suggestion of the Convair Aerospace-SD legal staff, Walsh had a local attorney arrange for a patent search and issuance of the patent. He now plans to contact firms that manufacture punches and counters to see if they wish to produce and market his new "product."

Maj. Putney Appointed DCAS Chief for SD

Maj. Robert F. Putney, USAF, has assumed new duties as Chief of the Defense Contract Administration Services Office at Convair Aerospace Division's San Diego operation. He succeeds Lt.



Maj. Putney

Col. Joseph B. Garrison who retired in June. His office is at the Kearny Mesa plant.

Maj. Putney recently completed a four-year assignment with the F-111 System Program Office (SPO) at Wright-Patterson AFB, Ohio, where he was Assistant Project Director for F-111 A and E-series aircraft. The F-111 SPO is responsible for procurement of F-111s for the U.S. Air Force and Royal Australian Air Force.

Previously, Maj. Putney had served as an F-100 fighter pilot at Bien Hoa AB, Viet Nam, in 1966-67 and studied mechanical engineering at Arizona State University in Tempe from 1963 to 1966.

★ ★ ★

Capt. Karlin's Duty Tour At San Diego Completed

Capt. Vern Karlin, USAF, chief of the production division of the Defense Contract Administration Services Office (DCASO) for General Dynamics' operations in San Diego for the past two years, was to begin a new assignment this week with the Special Projects Office at the Air Force Space and Missile Systems Organization in Los Angeles.

He has been with the DCAS office at the Kearny Mesa plant four years.

Walter Galpin Dies; Veteran of 30 Years

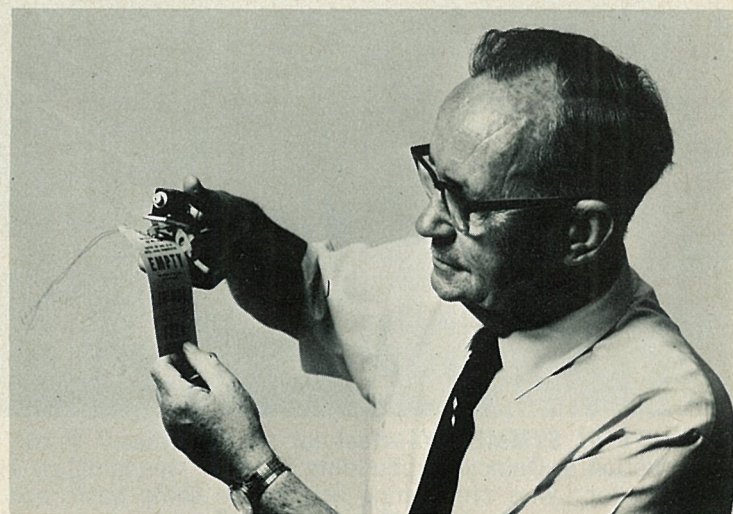
Walter Galpin, a subcontractor representative for Convair Aerospace-SD's Dept. 810-1 and a 30-year veteran with the division, died of a heart attack July 13. He had held a number of previous duties including those of form builder and tool designer.

P. M. Prophet Will Head SD Logistics Support

P. M. Prophet has been appointed manager of logistics support for Convair Aerospace-SD, reporting to J. M. Adamson, director of operations.

Reporting to Prophet are customer maintenance service (Dept. 057-0), field service, (Dept. 058-0), and spares support (Dept. 206-0).

Invest in America and your own future. Buy U.S. Savings Bonds by payroll deduction.



PATENTED—John Walsh, veteran Convair Aerospace-SD material department employee, uses combination paper punch and counter for which he has been issued a U.S. patent.



PRIZE PREVIEW — Carol Schmidt of Dept. 101-6 looks over prizes to be awarded in scholarship drawing at Convair Aerospace-SD family picnic Sunday after next.

Attendance Will Be Limited to 5,000 At Annual Family Picnic Set for Aug. 15

Attendance at Convair Aerospace-SD's annual all-employees' family picnic from 10 a.m. to 6 p.m. Aug. 15 in Missile Park will be limited to 5,000. Tickets are \$1 for adults and 75 cents for children under 10 and are on sale through all Convair Management Association boosters and at employee benefits and CRA outlets.

Barbeque beef dinner will be served from noon to 2 p.m. and special shows will be staged by Tahitian dancers, a barbershop quartet, a chorus, and the Pinecrest gunfighters.

A rock band will play for dancing by the younger set, a sawdust treasure hunt will be held for kids under six, and free rides will be provided all day on the merry-go-round, miniature train, a pony-pulled covered wagon, and a jump-for-joy balloon.

Special exhibits and demonstrations will be given by CRA Rockhounds, Miniature Railroad Club, and Sports Car Club. CRA Riding Club also has arranged for a blacksmith to shoe horses in the Western Town area.

Free balloons and favors and three five-cent tickets for soft drinks, popcorn, and ice cream will be given each child. "Mr. Buttons," a clown, also will entertain.

A singalong is scheduled at the picnic shelter and adult contests will include bingo, horse-shoes, pitch-and-putt golf, soft-

ball, batting, necktie and egg rolling races, and a mature men's leg competition. Junior events will include sack and spoon races and a water balloon toss.

Free punch and coffee will be served and beer will be 20 cents.

Funds will be raised for the Management Association's scholarship fund through operation of an executive dunking machine and a raffle. Three tries at dunking a Convair Aerospace-SD or Management Association executive will be 25 cents. Prizes in the drawing will include a tent trailer and five days free camping at Pinecrest, a set of golf clubs, a gas lantern, a camping stove, and a folding camp table. Raffle tickets will be sold at the gate and in the park.

Bob Ratliff and Ray Mendoza are picnic co-chairmen for the Management Association and CRA, respectively, and more than 150 members of the two organizations will be assisting with events.

Twenty-One Who Received Degrees, Certificates Honored at Annual Recognition Dinner

Twenty-one Convair Aerospace-SD and Electro Dynamic-SD employees were awarded Associate of Arts or Science degrees or Certificates of Proficiency in Supervision from the San Diego Community Colleges in a third annual awards recognition dinner July 9 in the downtown Holiday Inn.

Recipients, listed by award received, were:

Associate in Arts in Supervision degree—Clyde M. Hooper, James E. Lemon, Maston Thomas, George D. Carroll, and Dick Greer.

Associate of Science in Data Processing degree—Norville I. Yandell.

Certificate of Proficiency in Supervision—Richard J. Archibald, Reynaldo Chavez, Robert A. Cunningham, Kenneth Erickson (Electro Dynamic), Alexander C. Gates, Emery E. Farthing, Amos G. Lilley, Edward M. Lizarraras Jr., Willard Martin, Fred Matern, Robert J. Mastny, Wendell J. Peet, Kenith J. Rogers, Arthur G. Kozakiewicz, and Walter Wells.

Dr. Robert S. Hamilton, president of San Diego Evening College, presented the degrees which required completion of 60 units of college work. William B. Steinberg, director of vocational education for the San Diego Community Colleges, presented the Certificates of Proficiency which required successful completion of 10 three-unit courses in the supervision curriculum.

Glen B. Crider, manager of manufacturing for Solar, discussed development of people as an important part of a man-

John Milling Shifts To MacDonald's Staff

John D. Milling, controller for Convair Aerospace Division since its formation last year, has accepted a new position on the staff of Gordon E. MacDonald, Corporate vice president-finance.

E. E. Hatchett, formerly vice president-management and operations, has assumed additional responsibility for Convair Aerospace Division controller functions. His new title is vice president-management analysis and controller.

Milling had been controller for the former Convair Division since 1966 and previously had served six years as manager of accounting with responsibility for both general and cost accounting functions.

A graduate of Texas Tech, he joined Convair in 1943.

Hatchett had served as controller for the former Fort Worth Division since 1966 be-



John Milling



E. E. Hatchett

fore being appointed vice president-management and operations for Convair Aerospace Division.

He joined the Fort Worth Division in 1949 as a manufacturing engineer and later held a number of positions including statistical analyst, estimating supervisor, industrial engineering assistant supervisor, operations planning administrator, chief subsystems cost administrator, subcontract procurement administrator, procurement manager, manager of Grumman activities at Fort Worth, and manager of estimating.

Hatchett served in the Air Force during World War II and the Korean conflict, leaving as a major. He holds a degree in industrial engineering and management from Texas A and M.

Brown and Basquez Assigned New Duties In Convair Aerospace STOL Programs

James A. Brown has been appointed program manager for short takeoff and landing (STOL) aircraft programs and Joseph G. Basquez has assumed new responsibilities as sales manager for STOL programs for Convair Aerospace Division.

R. H. Widmer, vice president-research and engineering, said

Brown will report to M. R. Barlow, director of advanced systems, and will be responsible for all STOL activities at both the San Diego and Fort Worth operations.

J. T. Cosby, vice president-sales, said Basquez will continue to report to E. J. Hopley, director of sales-San Diego, and will



J. A. Brown



J. G. Basquez

coordinate all sales activities relating to STOL programs. "This responsibility is applicable to all military as well as NASA STOL programs and is very important to the division's future in this important field of activity," he said.

Brown has been assigned to the Space Shuttle program six months and previously worked on advanced aircraft design on the VFX, CARA, and A-X proposals.

He has been with Convair's research and engineering department since 1952 and previously had served as C-141 empenage program manager, on the product design staff, and as chief and manager of pre-design, chief of technical analysis, and senior thermodynamics group engineer.

Brown said his appointment "reflects Convair Aerospace Division's continuing interest in the STOL and V/STOL aircraft field and our determination to provide leadership in development of new technology for that field."

Basquez joined Convair Aerospace-SD in 1969 as a V/STOL advanced design engineer and has been assistant marketing manager-military programs for the past year.

He previously had served 13 years as an Air Force pilot, accumulating 3,000 hours of flight time in 45 different types of aircraft, and had served on the tri-service test force for military evaluation of V/STOL concepts at Edwards AFB, Calif. He holds master's degrees in aeronautical engineering and business administration and is a registered professional engineer.



STAR STITCHING — Mrs. Jeannie Smith of Tulsa, Okla., 1970-71 Mrs. U. S. Savings Bonds, stitches new star to Convair Aerospace - SD Minuteman banner as M. C. Curtis, left, vice president and general manager, and M. V. Wisdom, director of industrial relations, watch. More than 90 per cent of San Diego operation's personnel buy bonds through payroll savings plan. Special Treasury Department recognition for Savings Bonds program has been received for 12 consecutive years.

Yugoslavian Ham Sale Plan Revised

CRA has arranged for sale of Yugoslavian hams on Thursdays to employees at Lindbergh Field and Air Force Plant 19 and has revised sales hours at Missile Park.

Ray Mendoza, chief of recreation, said employees wishing to make purchases at the new locations must place orders by Wednesday each week by phoning ext. 1931 at Lindbergh Field or 2117 at Plant 19.

The hams will be available for pickup from 3:30 to 6 p.m. Thursday in the food canteen adjacent to Bldg. 33 at Lindbergh Field and from 3:30 to 4:30 p.m. Thursday in the employee benefits office at Plant 19.

Ham sales at Missile Park's concession stand are now from 9 a.m. to 5 p.m. Saturdays and Sundays and 3:30 to 6 p.m. Wednesdays.

The hams are being sold to Convair Aerospace-SD employees through an agreement with McDonnell Douglas as the result of an international "bartering" agreement that involved exchange of commodities for jetliners.

'Alumni' of Fairchild Plan Reunion Party

General Dynamics personnel who assisted with installation and checkout of the first Atlas E-series ballistic missiles at Fairchild AFB, Wash., have been invited to a 10th anniversary "sell-off party" and reunion dinner at 5:30 p.m. Sept. 4 in the Torrey Pines Inn, San Diego.

Fairchild was the first of three Strategic Air Command installations to receive Atlas-Es and the last of nine installations there was accepted by the Air Force on Sept. 28, 1961. During a peak period, there were 1,400 Convair employees and 1,200 subcontractor personnel there.

Dinner will be \$5.50, payable at the door. Reservations may be made with Bill Chana, Jim May, or John Zathan of Convair Aerospace-SD.

CRA Sports Car Club Plans Annual Show

CRA Sports Car Club has scheduled its second annual car show Aug. 22 at Missile Park and invited General Dynamics employees and family members to enter sports cars, dune buggies, antiques, hot rods, and other "special interest" vehicles.

Art Wrightson, president, said entries will be limited to 50 cars. There is no entry fee and awards will be given to the car judged best in each class.

Navigation Clinic Planned by Flyers

CRA Bonair Flyers will host a "Nav Knowledge Clinic" at 7:30 p.m. Aug. 17 in the CRA Clubhouse auditorium.

Don Tricebock of Narco Scientific Industries will discuss modern aircraft navigational equipment including area navigation and pictorial indicators. Recently developed general aviation avionics equipment will be displayed.

OLD RECORDINGS WILL BE PLAYED

Joe Garside will present 78-rpm recordings labeled as "a few oldies and a couple older than that" at the CRA Hi-Fi and Music Club's meeting at 7:30 Aug. 11 in the CRA Clubhouse studio.

'Scotty' Doig Given Craftsman Award

John "Scotty" Doig received an unprecedented Craftsmanship Award when he retired recently as manager of the Convair Aerospace-SD aircraft spare parts department.

The walnut award plaque contained a Craftsmanship emblem and an engraved message signed by Frank W. Davis, Division president. The message calls Doig "a Convair pioneer" and said "By his performance and high standards Scotty has exemplified the very essence of Craftsmanship in the Aerospace industry for 42 years."

Herb Day Appointed Office Services Chief

Herb Day has been appointed chief of office services (Dept. 170-0) for Convair Aerospace-SD, reporting to W. E. Wise, manager of plant services.

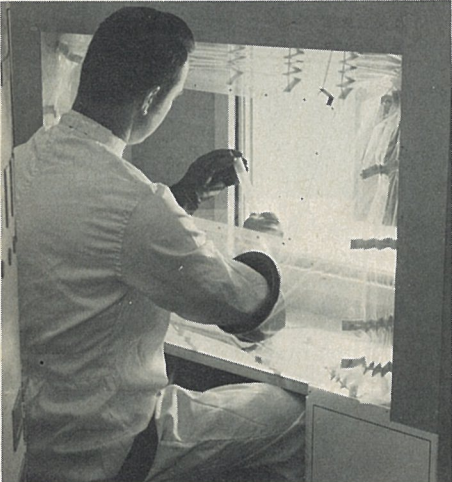
Reporting to Day are general services (Dept. 170-8) and telecommunications (Dept. 170-9) under D. B. Zink, motion pictures and television (Dept. 516-0) under Robert Montague, graphics and photo reproduction (Dept. 518-0) under L. S. Elmstrom, and still photography (Dept. 519-0) under Vern Heger.

NASA Contract

Research Conducted on Space Payloads

When scientists and engineers in Convair Aerospace Division's Life Sciences Dept. 592-0 in San Diego talk about "maxis, midis, and minis" they're usually not discussing the secretaries' dress lengths—but sizes of baseline life science research facilities for space missions from now through the 1980s and beyond.

These "mod" definitions are among those being used in a one-year, \$250,000 life sciences payload definition



CONCEPTUAL—D. W. Vorbeck of Convair Aerospace-SD simulates taking of biopsy through isolation barrier of laminar flow bench. Conceptual equipment designs are being generated in life science payload definition study.

study to be completed in November for the NASA Marshall Space Flight Center.

The study was initiated by the Office of Space Science and Applications and is now under the auspices of the newly organized Directorate of Life Sciences at NASA Headquarters. Its nature requires science and technology inputs from Ames Research Center, Manned Space Center, and Langley Research Center.

The study will provide a foundation for future orbital laboratories and missions required in the search for new knowledge of life sciences processes to be uncovered in the space environment. This new knowledge can be used to improve biomedical, biological, and ecological processes on earth for the benefit of man and his environment.

Mission models show "mini" life

science facilities as needing minimal equipment that can be launched as part of a Space Shuttle concept or a general purpose laboratory on "flights of opportunity."

The "midi" or intermediate-size facilities are, characteristically, those laboratories dedicated to life sciences in the 1977-80 time period that could be housed in a Research and Applications Module (RAM), delivered to and from orbit by Space Shuttle orbiter.

"Maxi" facilities, expected after 1980, would be housed in several RAMs and would be supported by a general-purpose space station complex with a crew of six to 12 men. These payloads would be dedicated to the accomplishment of a broad-base life sciences research program.

George Drake, study manager, said comprehensive equipment and functional inventories have been developed in the study to aid in the design of multi-purpose life science labs to accommodate a wide range of research in biology, biomedicine, life support and protective systems, and manned systems integration.

A computer program has been developed to integrate these two inventories and to provide rapid visibility of data for use both in selection of research capability for the missions and in equipment design and layout tasks.

The desired research capability of a particular facility is established by the scientific community within NASA, industry, and academe. These computerized inventories provide a detailed list of common use, general purpose, special purpose, auxiliary, and mission-support equipment to be used for each selected payload's research capability.

Conceptual equipment designs also are being generated as part of the research facility definition study. One, for example, shows a 21.5 by 26 by 20.5-inch common holding unit that could house 32 mice or 8 rats or 2 rabbits or a small monkey.

Key Convair Aerospace personnel working on the study, in addition to Drake, and their areas of responsibility include Don Vorbeck, biology and biomedicine; Gary Thomson, manned systems integration; Ed Russ, life support and subsystems; and A. R. "Bud" Perl, design analysis.

Fort Worth Operation Recalls Maiden Flight of XB-36 Quarter Century Ago

"Jumbo" aircraft are relatively new on the scene—but Fort Worth operation got into the act nearly 25 years ago.

On Aug. 8, 1946, a Fort Worth crew took the XB-36—then the world's largest bomber—on its maiden flight. B. A. Erickson and Gus Green piloted the aircraft on the 37-minute mission.

Fort Worth eventually built 385 of the giant Peacemakers, which flew world-wide deterrent missions for Strategic Air Command for over a decade.

The B-36 was a "jumbo," even by today's standards. It was over 162 feet long and had a wing span of 230 feet; its tail section was almost 47 feet high.

Performance credentials were even more amazing—for its time. The B-36,

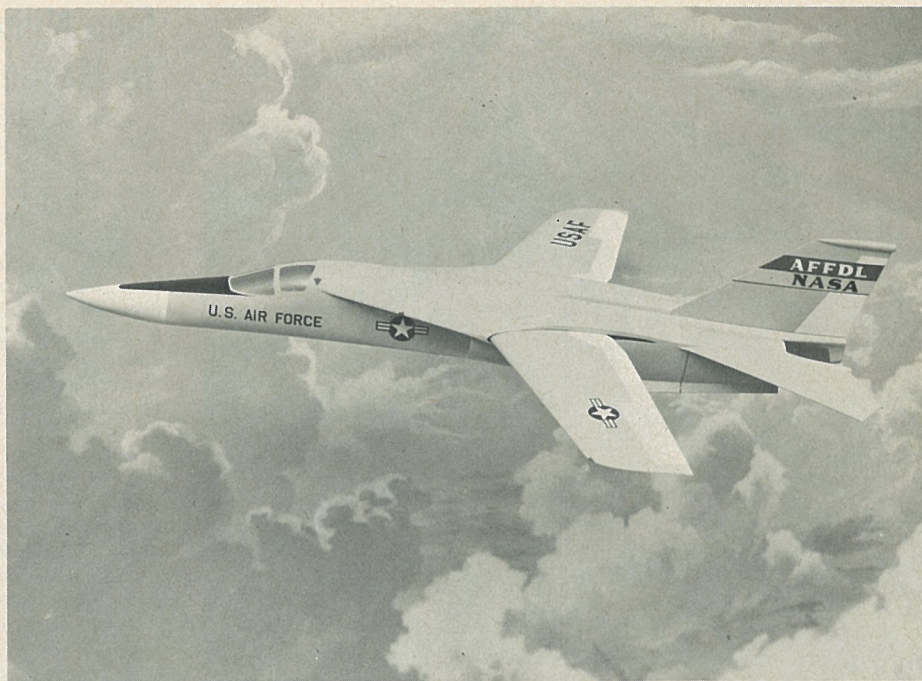
with six pusher-type engines and four jets, could travel at 435 miles an hour and had a ceiling of 45,000 feet.

Range for the B-36 was listed at 10,000 miles; maximum bomb load, 84,000 pounds. Gross weight was over 400,000 pounds.

Fort Worth employees built a reconnaissance version of the aircraft, the RB-36. They also made the NB-36, first aircraft to carry an operating atomic reactor in flight.

During the latter stages of the B-36 program, Fort Worth built the XC-99, an experimental transport. It could haul 400 troops or 100,000 pounds of cargo.

Reason enough, proponents contend, that the B-36 could be considered the first "jumbo"—about 20 years ahead of its time.



NEW WING — Fort Worth operation has won an Air Force contract to design and build a supercritical wing on an F-111, as shown on model. Air Force Flight Dynamics Laboratory (AFFDL) is working jointly with National Aeronautics and Space Administration on the program.

Supercritical Wing Technology Will Be Explored, Using F-111

Fort Worth operation has received a \$2,414,900 letter contract to design and build a supercritical wing to be flight-tested on an F-111.

The contract, which will have a total estimated value of \$12,900,000, was awarded by Air Force Systems Command's Flight Dynamics Laboratory (AFFDL) at Wright-Patterson AFB, Ohio.

AFFDL will manage the overall effort, working jointly with National Aeronautics and Space Administration on the Transonic Aircraft Technology (TACT) program.

The NASA Flight Research Center at Edwards AFB, Calif., will be responsible for TACT flight-test operations after the F-111 has been modified and instrumented at Fort Worth.

Primary goal of the TACT program is to "explore and evaluate the application of supercritical wing technology to highly maneuverable advanced aircraft."

E. B. Maske has been named TACT program director at Fort Worth.

"The TACT wing," according to a NASA release, "is one of a family of supercritical airfoils originated by Dr. R. T. Whitcomb at NASA. They are shaped to displace rearward the shock wave that normally forms on the upper wing surface when aircraft operate near the speed of sound.

"The shock normally is located over the spot where the wing is thickest. Supercritical shaping moves it back near the trailing edge. This displacement serves to minimize drag, buffeting and other adverse effects of air-flow separation induced by the shock wave."

Experimental results have shown that a supercritical wing on a high-performance combat aircraft can im-

prove maneuverability at transonic speeds (near Mach 1).

The Air Force, NASA's Langley Research Center, and General Dynamics have completed approximately 1,800 hours of wind-tunnel tests to develop the supercritical airfoil for the TACT program.

Final configuration development and wind-tunnel tests for low-speed, high-lift devices and transonic and supersonic conditions will be conducted at NASA's Ames Research Center, Mountain View, Calif.

Aircraft configuration freeze and preliminary design review are scheduled for November, 1971. First flight is slated for mid-1973.

Grasshopper System Contract Continued

A \$2.19 million Air Force contract has been awarded General Dynamics for continuing engineering development of the Grasshopper anti-vehicle mine system. The 19-month contract was awarded by the Armament Development Test Center, Engineering Developing Division, Mines Branch at Eglin Air Force Base, Florida.

The Grasshopper target activated mine, air-delivered by fighter aircraft, will employ advanced sensor technology and specialized warhead capability.

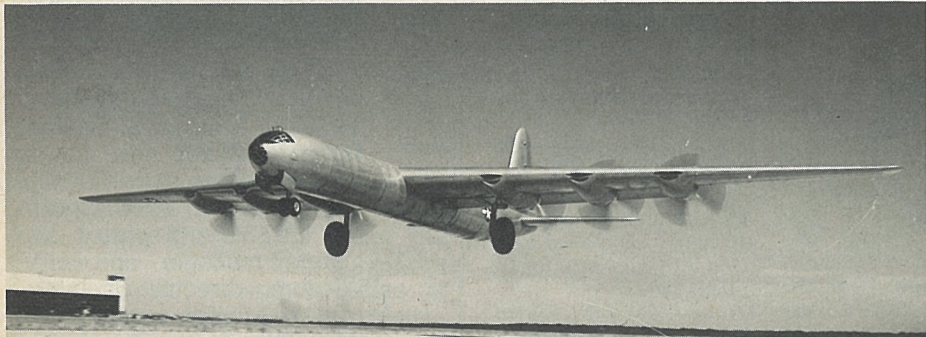
Previous work at the Electro Dynamic Division's Pomona operation included feasibility of anti-personnel and anti-vehicle sensors. The current development work will be highlighted by moving target warhead tests and an operational flight demonstration of the Grasshopper system without a warhead.

People Mobility

Personnel Transfers Within GD

(Following are recent personnel transfers within General Dynamics. In parenthesis are dates when individuals joined the company.)

ROY W. JONES (1942) from Electro Dynamic Division-Rochester to Stromberg-Carlson as general foreman; BERTRAND B. BOSSE (1958) from Quincy Shipbuilding to program coordinator, Electric Boat; GEORGE J. DE BELL (1962) from ED-Pomona to ED-SD as manager of business systems and data systems; DONALD G. ROSIN (1934) from ED-Roch. to S-C as buyer; WILLIAM W. PRICE (1969) from ED-Pomona to financial analyst, ED-SD; CHARLES H. TEWKSBURY (1964) from Quincy to EB as quality control analyst; JOHN R. SALZER (1956) from Quincy to EB as facilities analysis manager; JERRY M. RATLIFF (1967) from ED-Roch. to ED-SD as management systems specialist; ROBERT F. TOMEI (1951) from ED-Roch to chief expeditor, S-C; JOHN VAN SCHARNHORST (1969) from Convair Aerospace-FW to manufacturing development engineer, ED-SD; WALTER W. LONG (1967) from S-C to Corporate Headquarters; EDGAR T. ROESCH (1957) from ED-Roch. to ED-SD as quality control engineer; RICHARD J. KOWALCZYK (1965) from Convair-SD to design specialist, ED-SD; DAVID W. HOKE (1956) from Convair-FW to Corporate Headquarters; EDWARD DE MERS (1959) from ED-SD to Convair-SD; ROBERT W. WEBER (1952) from Convair-SD to senior engineer, ED-SD; JACK L. REICH (1954) from ED-Pomona to ED-SD as senior management systems analyst; FRED F. NARZISI (1966) from ED-Pomona to senior financial analyst, ED-SD; THEODORE R. MACCONNELL (1961) from Convair-FW to Convair-SD; MATHEW L. VINSON III (1967) from Convair-FW to Convair-SD; CHARLES H. GUTZLER (1956) from ED-SD to Convair-SD.



HISTORY-MAKER — The XB-36 is shown making its first flight at Fort Worth operation Aug. 8, 1946.

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August 18, 1971



NEWCOMER — Despite rainy weather, over 1,000 were on hand last month to welcome the first FB-111A to the 380th Strategic Aerospace Wing at Plattsburgh AFB, N.Y. The aircraft is being directed into hangar for welcoming ceremony.

Thousand Turn Out Despite Rain To Greet FB-111 at Plattsburgh

Transfer of FB-111As from the 340th Bomb Group at Carswell AFB, Texas, to the 380th Strategic Aerospace Wing at Plattsburgh AFB, N.Y., is slated for completion in September.

The move started last month when Col. G. R. Abendhoff, 380th commander, flew the first FB-111A—tagged the “Spirit of Plattsburgh”—into the New York base.

An estimated 1,000 people were on hand to welcome the first FB-111A to the 380th. The aircraft made two fly-bys—one with the wings extended, the other with wings fully swept.

The welcoming ceremony took place in a base hangar, where visitors later got a close-up look of the aircraft.

N. B. Robbins, vice president-111 programs, and L. B. Goodwin, SAC programs director, represented Fort

Worth operation at the ceremony.

Other dignitaries included: Hon. Norman L. Harvey, State of New York Supreme Court Justice; State Senator Ronald B. Stafford; Assemblyman Andrew W. Ryan Jr.; and Plattsburgh Mayor Francis D. Steltzer.

The tenth FB-111A was slated to arrive at Plattsburgh this week, and final delivery is slated for some time in September.

A total of 38 FB-111As are to be assigned to the 380th. This includes 16 bombers each for the 528th and 529th Bombardment Squadrons. The six remaining planes will be attached to the Combat Crew Training School.

Strategic Air Command's 509th Bombardment Wing at Pease AFB, N.H., is already fully equipped with FB-111s.

DC-10 Pays Visit to San Diego Plant; First Commercial Service Inaugurated

DC-10 fuselage production workers at Convair Aerospace Division's San Diego operation had an opportunity to see the end result of their craftsmanship last Thursday when one of the new wide-cabin tri-jetliners from the

McDonnell Douglas test fleet made its first visit to the Lindbergh Field plant.

Convair Aerospace Division and McDonnell Douglas officials were present for a brief ceremony during the lunch-
(Continued on Page 6)

Atlas Launches Nine Experiments in Orbit

Two Orbital Vehicle One (OV1) satellites, designed and built by Convair Aerospace Division's San Diego operation, were launched simultaneously atop a refurbished Atlas missile from Vandenberg AFB, Calif., Aug. 6 and placed nine Army, Navy, and Air Force scientific experiments into three different orbits.

The precision launch was part of the Department of Defense Space Experiments Support Program (SESP), managed by the Air Force Systems Command's Space and Missile Systems Organization (SAMSO), which provides rides into space for DOD space research projects not authorized for their own boosters.

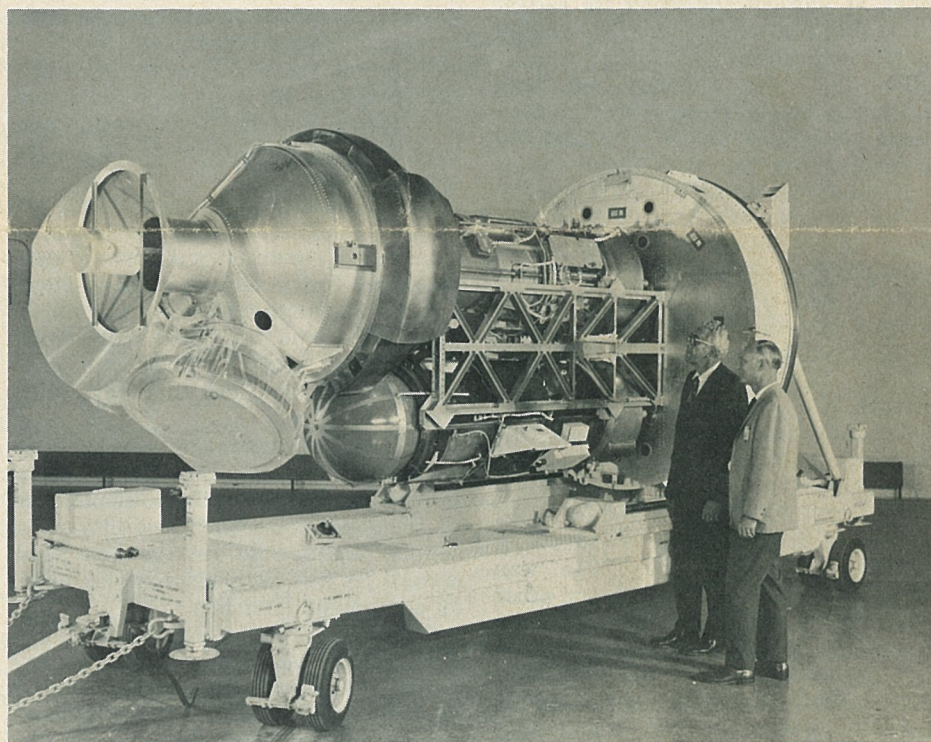
The two OV1 vehicles (OV1-20 and OV1-21) rode into polar orbit atop Atlas 76F before being ejected. After a brief coast in which pre-programmed steering maneuvers were performed,

the OV1's own solid-fuel motors were fired for about 30 seconds each to inject them into their respective orbits.

OV1-20 carried three experiments. Included was an 800-pound Cannon Ball II satellite ejected into its own orbit and two experiments that remained aboard as OV1-20 was fired into an orbit with a perigee of 72 nautical miles and an apogee of 1,060 nautical miles.

OV1-21 carried six experiments. Three of these required ejection of six satellites (including four related to the same experiment). The remaining three experiments remained aboard as the OV1-21 was placed in an orbit of 432 by 498 nautical miles.

Convair Aerospace representatives at Vandenberg for the launch included L. E. “Vern” Ottem, OV1 program manager; Kenneth E. Newton, direc-
(Continued on Page 2)



SATELLITE SCENE—K. E. Newton, left, director of launch vehicle programs for Convair Aerospace Division, and L. E. Ottem, Orbital Vehicle One (OV1) program manager, check OV1 satellites 20 (lower position) and 21 on their mounting truss before being encapsulated in protective fairing at Kearny Mesa plant in San Diego. The two satellites rode into space atop a refurbished Atlas missile.

David Lewis Predicts Profitable 1971 For General Dynamics

Net income of General Dynamics for the quarter ended June 30, 1971 was \$3,999,000, equivalent to \$0.38 per share of common stock, on sales of \$493,000,000, David S. Lewis, Chairman, announced Aug. 4. This represents an increase over the \$3,690,000 or \$0.35 per common share for the second quarter of 1970 on sales of \$592,000,000.

Net income for the six months was \$8,552,000 on sales of \$949,000,000 or

\$0.81 per common share, compared to a reported income of \$15,196,000 for the first six months of 1970 or \$1.44 per share on sales of \$1,160,864,000.

Lewis, in commenting on the six months results said, “At this time, it does not appear that it will be necessary to provide for major adjustments at year end 1971 to cover cost overruns as became necessary last year. Thus, we believe 1971 will be a profitable year.”

New General Dynamics Headquarters Now Fully Staffed at St. Louis

The new Corporate address is Pierre Laclède Center, St. Louis, Missouri, where General Dynamics Headquarters is now fully staffed and running smoothly after relocating from One Rockefeller Plaza in New York City.

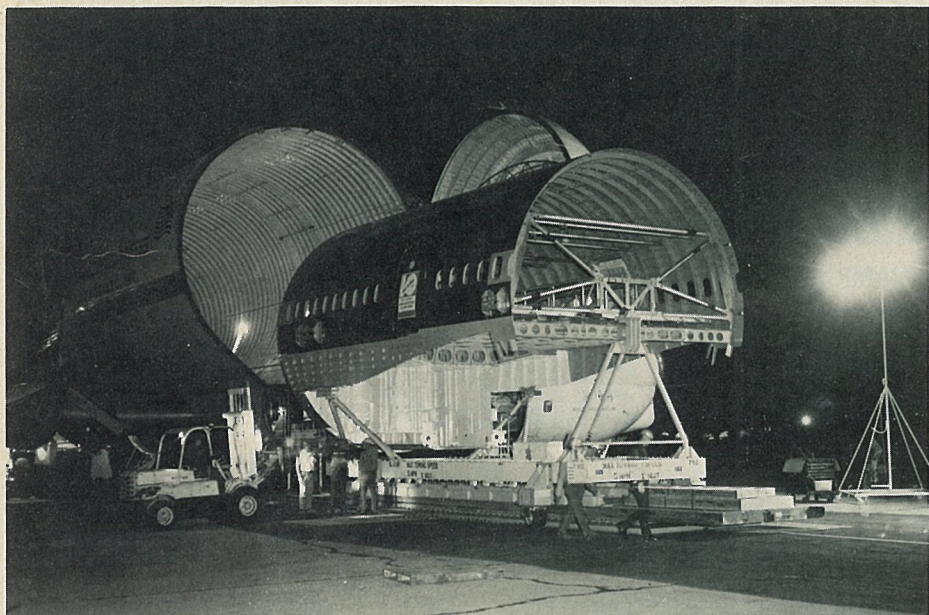
Headquarters occupies four floors in the 23 story Pierre Laclède Center

building located in the progressive, growing community of Clayton, Missouri, 10 miles West of downtown St. Louis and 976 miles West of New York's Rockefeller Center.

Pierre Laclède is the founding father of St. Louis, having led a band
(Continued on Page 6)



DOUBLE DELIVERY—First McDonnell Douglas DC-10s (with wide-cabin fuselages built by Convair Aerospace Division) were delivered to American and United Air Lines last month. DC-3 in foreground provided size comparison. Secor Brown, Civil Aeronautics Board chairman, and Jack Shaffer, Federal Aviation Administration administrator, were among speakers at delivery ceremonies.



EARLY FLIGHT—Fuselage E-section for first DC-10 Series 20 aircraft is shown being loaded aboard Super Guppy airfreighter at 4 a.m. July 26 for flight from Convair Aerospace-SD's Lindbergh Field (Calif.) plant. This completed delivery of fuselage sections for the first DC-10-20 liner.

"Atlas"...

(Continued from Page 1)

tor of launch vehicle programs; A. E. "Red" Berndes, Atlas program office engineer for SESP missions; and P. V. Smith, chief of systems engineering for the OV1 program office.

About 40 "back-up" launch vehicle programs engineers listened to the launch countdown and flight sequencing at the Kearny Mesa plant in San Diego via a direct telephone hookup with Vandenberg's ABRES A-2 launch complex.

Atlas 76F had been refurbished by Convair Aerospace-SD personnel after years of storage following its retirement from Strategic Air Command operational inventory.

The two OV1 vehicles had been designed and fabricated by the San Diego operation under a \$3,345,000 contract from the Air Force Space and Missile Systems Organization.

The launch was the first in the SESP series in which Convair Aerospace-SD had responsibility for both booster and spacecraft guidance. Booster targeting for previous launches had been accomplished by TRW.

Denny Barber was launch conductor with H. W. Anderson as assistant.

W. J. Hammond, supervisor of test planning and control for Convair Aerospace-SD launch vehicle programs, said the entire flight of Atlas 76F from its liftoff at Vandenberg through release of the OV1s was "right on the button." The Atlas, after releasing the OV1 vehicles, continued on a ballistic reentry trajectory.

Offem said flights of the OV1s and their release of experiment packages was "as predicted." Command and data telemetry systems were functioning normally.

The experiments will provide a wide range of scientific data.

Air Force Cambridge Research Laboratory's Cannon Ball II and Musket Ball experiments are designed to make air density measurements in the fringes of the earth's atmosphere.

Cannon Ball II, a cast bronze sphere 26 inches in diameter and weighing 800 pounds, is expected to set a new world record for low orbits at below 60 miles during its six-month life span. Its "little brother" Musket Ball is 12 inches in diameter and weighs 135 pounds.

The Air Force Avionics Laboratory sponsored a four-part payload consisting of a two-foot diameter rigid

sphere and a cannister containing three inflatable spheres to provide comparative aerodynamic data for potential use in design and development of orbiting vehicles.

Two of the inflatable spheres are constructed of wire mesh embedded in a film that was to deteriorate through a chemical reaction to sunlight, leaving only the wire mesh surface. The third inflatable sphere is made of mylar sandwiched between aluminum foil.

Another sphere, hollow and made of aluminum, was designed by the Lincoln Laboratory of Massachusetts Institute of Technology for the U.S. Army Advanced Ballistic Missile Defense Agency. It serves as a target for calibration of radar systems.

Three of the experiments on board are sponsored by the Air Force Space and Missile Systems Organization and were built by the non-profit Aerospace Corporation.

One is measuring energy characteristics from the sun trapped in space near earth, another will test a new technique for measurement of electron density and temperature in the upper ionosphere, and the third will record the flow of solar particles and rays toward earth and how they vary with time.

Aerospace Corporation also built an experiment for the U.S. Navy which is investigating the effects of plasmas in the ionosphere on the ability of a sample antenna to receive and send signals. It was the most complex piece of equipment launched.

The Air Force Cambridge Research Laboratory also is sponsor of an experiment to accurately measure atomic oxygen density in the outer atmosphere and to measure variations in the density during increased geomagnetic activity.

The Atlas launch was under the direction of the 6595th Aerospace Test Wing at Vandenberg AFB.

Animated World Map Features Ocean Data Station Locations

An animated world map showing locations of General Dynamics-built Ocean Data Stations and Ocean Navigation Stations and 1/20-scale models of both types of platforms are being featured in the General Dynamics exhibit at the Marine Technology Society's seventh annual conference and exposition this week in Washington, D.C.

Presently there are 12 of the 40-foot-diameter and 100-ton moored platforms in service throughout the world.

Six additional Ocean Data Stations are being produced by the Electro Dynamic Division's Electronics operation in San Diego under a \$5.5 million contract from the National Oceanic and Atmospheric Administration (NOAA) for deployment in the Gulf of Mexico beginning early next year.

Ocean Data Stations are operated by NOAA's National Data Buoy Project. Ocean Navigation Stations are operated by the U.S. Coast Guard and Trinity House Lighthouse Service in England.

Currently, one Ocean Data Station is moored in the Atlantic off the coast of Norfolk, Va., and two others are stationed in the Pacific Ocean.

These buoys automatically acquire and transmit environmental data, on command, to shore-based data collection centers. Information received is provided to user organizations such as the U.S. Navy, the National Weather Service, and the National Marine Fisheries Service.

Four Ocean Navigation Stations are moored off the New Jersey coast, two in the waters off California, one in the Gulf of Mexico, and one off the west coast of England where it is operated by Trinity House. They are designed as a primary aid-to-navigation, replacing manned lightships.

General Dynamics is the world's most experienced producer of such systems.

The Corporation's ocean station systems programs began in 1960 with specifications calling for the design and fabrication of an Ocean Data Station capable of unattended operation for one year while automatically acquiring and transmitting oceanographic and meteorological data. The station also was required to remain fully operational under hurricane conditions of 150-knot winds, 60-foot waves, and 10-knot currents.

Engineers and technicians began several years of analytical analysis and model testing of various hull shapes and superstructures able to exceed the design requirements.

The result was a 40-foot, disc-shaped hull with acquisition and telemetry equipment powered by on-board generating equipment. The sensor package was capable of monitoring air and water temperature, air pressure, dewpoint, wind and water current velocity, solar radiation, precipitation,

wave heights, and salinity.

Initial deployments of the prototype buoy proved the structural integrity and systems reliability of the design.

Ocean Data Station Bravo, moored in the Gulf Stream off Hollywood, Fla., faced the full fury of Hurricane Betsy in 1965 and performed routinely and without interruption under the pounding of 50-foot waves and winds exceeding 100 miles per hour.

During 1966, two deployments were made off the coast of Bermuda to test Bravo's mooring line capabilities at depths of 12,600 and 19,000 feet.

The first operational use of an Ocean Data Station by the Office of Naval Research began in 1967 when buoy Alpha was stationed in 3,000 feet of water off the coast of California.

Environmental data acquired by Alpha was transmitted to a General Dynamics-designed data station in San Diego. From this station, Alpha was electronically commanded to transmit data at prescribed intervals. In turn, the data was relayed to user organizations for interpretation and dissemination.

Under sponsorship of the Office of Naval Research, Scripps Institution of Oceanography began the North Pacific Study in 1968 to investigate a portion of the Pacific north of Hawaii which has an unusual influence on weather patterns affecting the U.S.

Bravo and Alpha were moored in 18,000 feet of water at different locations to act as data acquisition platforms for the study. Alpha still remains on-station transmitting information to a shore-based data station in San Diego.

The reliability of a General Dynamics-developed high-frequency telemetry system also was proven in the North Pacific Study. Using NASA's Applications Technology and Nimbus satellites, space telemetry from ocean stations was successfully transmitted—opening the way for a global ocean data station network supported by satellite communications.

In February last year, the NOAA National Data Buoy Project began operating an Ocean Data Station designated as XERB-1 (for Experimental Environmental Reporting Buoy) in the Gulf Stream about 125 miles east of the Virginia coast. Data it acquires is telemetered to a Coast Guard-operated data station in Miami, Fla., for use by the National Weather Service.

Electro Dynamic officials say XERB-1's superior design and outstanding performance record led to the current NOAA contract for Ocean Data Stations to be deployed in the Gulf of Mexico beginning early in 1972.

General Dynamics' design of Ocean Navigation Stations have been concurrent with development of the Ocean Data Station platforms.

Similar in size to the data buoy, the Ocean Navigation Station is also designed to operate unattended for one year. It is equipped with a xenon light beacon, fog signal, radar transponder, and strong passive radar return and is brightly painted for daylight visual identification. It also is capable of monitoring coastal water pollution.

The U.S. Coast Guard deployed the first Ocean Navigation Station in 1967 to replace the Scotland lightship at the southern approach to New York harbor. Presently on-station, it has withstood severe weather while delivering uninterrupted service. Seven additional Ocean Navigation Stations have been placed in service by the Coast Guard since that time.

Trinity House, operator of the world's largest fleet of lightships, also placed a General Dynamics-designed Ocean Navigation Station off the west coast of England on Dec. 1, 1970. More are planned as Trinity House expands its ocean navigation station system.

After more than 10 years of ocean operations, the versatile General Dynamics' Ocean Data and Ocean Navigation Stations are considered the vanguard of an international buoy network for environmental monitoring and safety on the high seas.

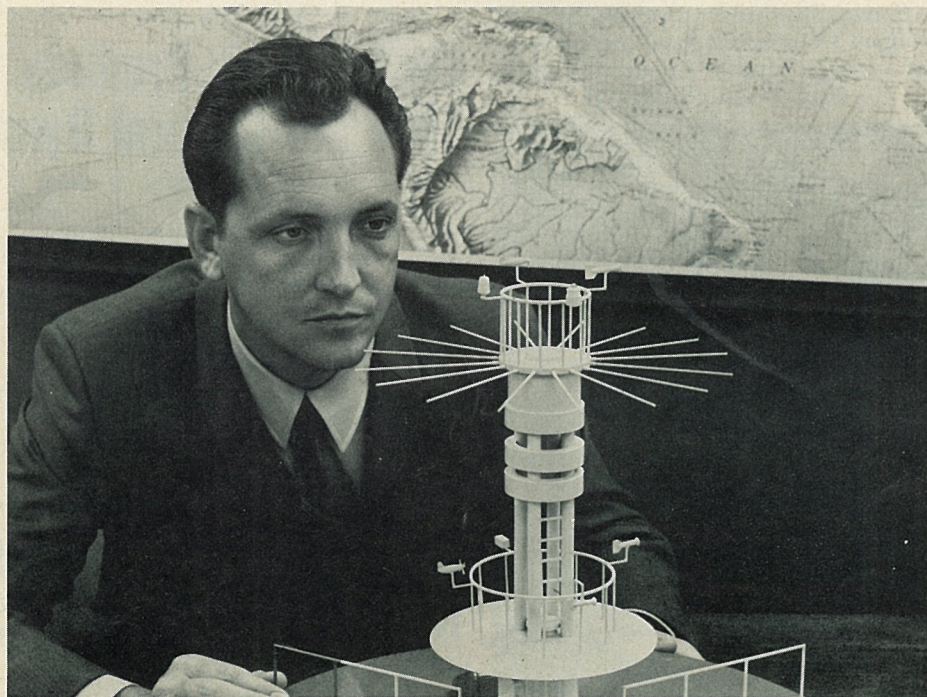
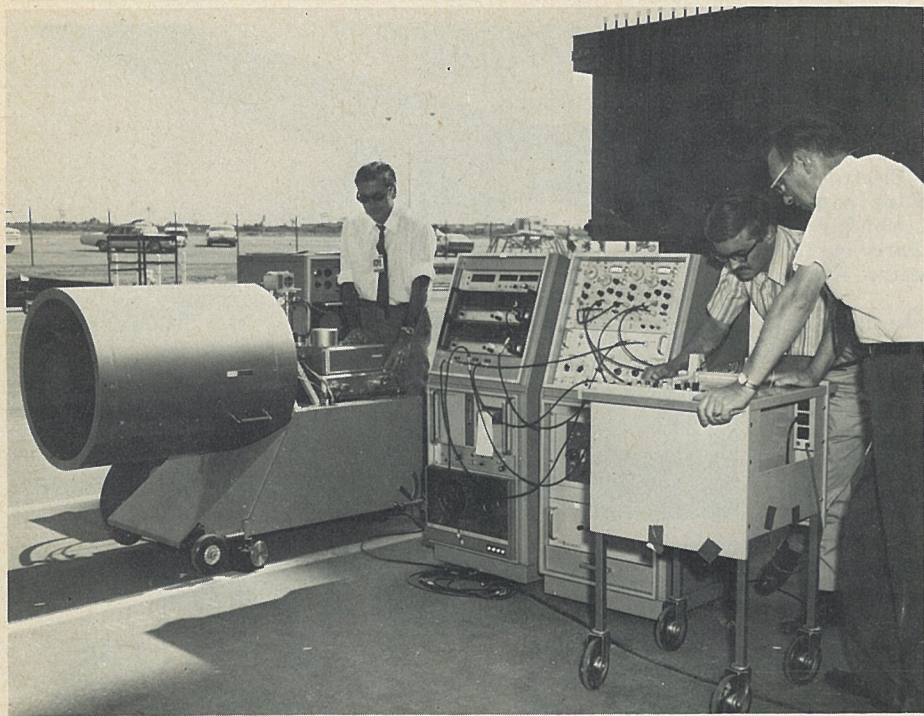


EXHIBIT MODEL—Roy V. Woodle, Electro Dynamic Division program manager for national data buoy systems, inspects 1/20-scale model of new Ocean Data Station being produced for National Oceanic and Atmospheric Administration that is being exhibited this week at Marine Technology Society exposition in Washington, D.C.

General Dynamics World

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ATMOSPHERE ANALYSIS—Remote Optical Sensing of the Environment (ROSE) system, developed by Convair Aerospace-SD, determines amounts of various pollutants in urban atmosphere. Operating system during check-out tests at Kearny Mesa plant, from left, are Claus Ludwig, Mike Barnes of U.S. Environmental Protection Agency, and M. L. Streiff.

New Optical Sensing System Spots Pollutant 'Fingerprints'

A new optical sensing system that can identify the unique infrared "fingerprints" of various pollutants in the urban atmosphere has been developed by Convair Aerospace Division for the U.S. Environmental Protection Agency (EPA).

The system, called ROSE (for Remote Optical Sensing of the Environment), was used recently by Convair Aerospace and EPA personnel in the first of a series of field tests to be conducted during a six-month period in and near Pomona, Calif.

Data obtained is being analyzed to identify and determine the concentration of different types of pollutants and to verify the new system's capabilities and limitations.

An interferometer system developed by General Dynamics' Electro Dynamic Division for detection of selected pollutants and an infrared-radiation spectrophotometer developed by Bendix for ozone detection is being used at the same time for comparison measurements.

Dr. Claus B. Ludwig, senior staff scientist responsible for remote sensing research at Convair Aerospace Division's San Diego operation, said the ROSE system was developed under a \$150,000 EPA contract and has been designed to provide precise measurement of pollutants in the atmosphere in urban areas and to aid in the development of simpler and lower-cost remote optical sensing instruments.

It utilizes a receiver telescope of two-foot-diameter, a monochromator for separation of pollutant wave lengths, a system to cool detector devices to -247 degrees centigrade, and related electronic recording equipment including a unique automatic system for display of wave lengths being recorded. It can be powered by a portable power generator.

Mariner 9 Travels Over Million Miles

Mariner 9, launched with precision May 30 by Convair Aerospace Division's Atlas-Centaur 23, early this month had traveled more than a million miles on its curving path around the sun toward a rendezvous with the planet Mars.

After a 167-day flight, the modern Mariner is scheduled to go into orbit around the "red planet" on Nov. 13. A small correction of its flight course is planned late in October to prepare it for a precision injection into Mars orbit.

During 90 days in orbit around Mars, Mariner 9 is scheduled to map about 70 per cent of the planet's surface with TV cameras. Other experiments will record atmospheric and surface data.

Dr. Ludwig pointed out that each pollutant has a unique infrared spectral "signature" or "fingerprint" that can be separated from background signals by the ROSE system. Signals obtained and data from previous laboratory studies then are used to determine the concentration of each pollutant over a selected range.

The initial tests were conducted over one and two-mile distances between the infrared source and receiver on Electro Dynamic's Pomona operation property and including measurements for carbon monoxide, sulfur dioxide, ammonia, ozone, and other pollutants.

The testing was spaced to provide maximum atmospheric variation at the test sites and was conducted in cooperation with Drs. William Herget and Mike Barnes, research physicists from EPA's Division of Chemistry and Physics in Research Triangle Park, N.C.

Tests also were conducted to measure pollutants in smoke stack exhaust plumes from steel mill and power plants.

Later tests during the six-month period will include sensing of pollutant concentration from exhaust stacks of oil refineries and chemical complexes.

Spectral measurements of the exhaust stacks will be made with the ROSE receiver pointed at the wall of the stack to measure the atmosphere between the source and the receiver, at the plume above the stack to measure the pollutants of interest, and at a point adjacent to the stack to establish background levels. Measurements will be taken several times at each location during different atmospheric conditions and during day and night hours.

Both the ROSE system developed by Convair Aerospace-SD and the interferometer developed by Electro Dynamic-Pomona are equipped with digital tape recording devices for later computer processing of data obtained. A visual recorder with the ROSE system plots signals received for immediate use by personnel conducting the tests.

Engineers and scientists from Convair Aerospace-SD have been working 12 years on spectroscopical studies of rocket plume emission and atmospheric physics. Several previous atmospheric sensor systems have been developed with company funds and under contracts from NASA and the Department of Defense.

The ROSE system was designed and developed by Maurice Streiff and its electronics by Charles Claysmith. Dr. Mike Griggs has provided technical assistance and has conducted some of the field tests. Purchasing for the system was handled by L. J. MacDonald. Others from Convair Aerospace-SD assisting have included Loren Wilson, Carlos Abeyta, Marvin Fox, Larry Acton, Gordon Hall, and Roy Bartle.

NASA's 'Flying Laboratory' Aiding Scientists in Studies of Mars

NASA's Convair 990 flying laboratory is being used this month to give scientists a rare opportunity to investigate the planet Mars' infrared light radiations from above 99 per cent of earth's occluding atmospheric water vapor.

The aircraft, named "Galileo" after the pioneer astronomer and inventor of the telescope, is operated by NASA's Ames Research Center in Mountain View, Calif., and was scheduled to carry the scientists and their 10,000 pounds of instruments on at least three midnight flights near Hawaii to seek new information on Mars' atmosphere, surface water content, and temperature.

The new investigations, together with information from the 1969 and 1971 Mariner Mars probes launched by Convair Aerospace Division Atlas-Centaur vehicles, will greatly enhance man's knowledge about its neighbor planet.

The Galileo, the first Convair 990 test aircraft, was modified at Convair Aerospace Division's Lindbergh Field plant with special view ports and other instrumentation being installed in 1965 and 1966.

It previously has been used on flights to gather information on the Ikeya-Seki comet in 1965, during eclipses of the sun over the South Pacific and South America in 1965 and 1966, and for a variety of other aerospace research tasks.

The Mars observation flights this month were originating at Hickam AFB, Hawaii, with the flight path about 540 miles south of Hawaii along the 13 degree north latitude meridian. Scientists aboard for the first six-hour flight on Aug. 4-5 reported good visibility. Data obtained was being processed through computers.

During the close Mars approach to earth, the planet will be about 35 million miles away and will be the brightest object in the sky after the sun, moon, and Venus. The last time Mars was this near earth was in 1671.

A University of Hawaii team aboard the 990, headed by Dr. W. M. Sinton, was conducting an experiment to determine the relationship between electromagnetic radiation from Mars and its infrared emissions.

A group from the University of Arizona under Dr. G. P. Kuiper were using a telescope-computer system to identify spectral features of the Martian atmosphere.

A Cornell University experiment directed by Dr. J. R. Houck was to measure water present in crystalline materials on the planet's surface.

Water vapor in the earth's atmosphere prevents most ground-based measurements of infrared light originating from objects in space. Scientists on the Convair 990 can fly above most of this atmosphere filter and obtain data on the infrared spectrum which is otherwise unobtainable.

By calculating the amount of water vapor between the aircraft and the airless moon, a correction can be ap-

plied to the airborne measurements of Mars infrared emissions so that the small amount of water vapor above the aircraft is subtracted out. Dr. P. M. Kuhn of the National Oceanic and Atmospheric Administration (NOAA) is in charge of the experiment to provide correction data.

Several on-board experiments were using the Galileo for purposes not connected with Mars.

Dr. W. L. Smith of NOAA was to test a new instrument to be flown on the NASA Nimbus-E mission to measure infrared radiation by the earth's surface and by clouds.

Dr. James Weinman of the University of Wisconsin was to use a pulsed ruby laser to measure small particles in the stratosphere. Dr. Ira Noli and Dr. James Radostitz of the University of Oregon were to investigate patterns of infrared emissions from the earth's atmosphere.

Ernest Iufer of NASA-Ames was to use a vector magnetometer to aid investigations of continental drift and sea floor spreading.

A total of 45 individuals from NASA, the universities, and other organizations were participating in the operation.

Fundings of \$7,357,000 Continue Missile Work

Pomona operation of Electro Dynamic Division recently received approval of three separate fundings totaling \$7,357,000 for continued work on Navy missile programs.

The Navy awarded a \$3,200,000 contract to Pomona for continued engineering development of the Close-In Weapon System (CIWS). This award brings total funding for this program to \$10,600,000. Earlier fundings were for initial technical, scientific and program management efforts associated with the engineering development phase. Impressive results have been achieved in recent developmental tests of the CIWS system.

The Naval Ordnance Systems Command has awarded a \$2,057,000 contract to Pomona for engineering services to provide logistic support for missile systems. The contract calls for both in-plant and field work on Tartar, Terrier, Standard and Standard ARM missile systems.

Added funds of \$2,100,000 were received for continuation of development tasks related to the Standard Missile configuration. The Naval Ordnance Systems Command is the contracting activity.

'Working Underwater' Session Held in D.C.

Dr. Robert J. McGrattan of Electric Boat Division was one of two chairmen for a "Working Underwater" session Aug. 17 at Marine Technology Society's seventh annual conference in Washington, D.C.



MODERN GALILEO—NASA's Convair 990 flying lab is being used this month for high-altitude observation of Mars infrared radiation. Plane was built and modified for use as a flying laboratory at Convair Aerospace Division plant in San Diego.



MINORITY AIDES — Members of Electro Dynamic-SD Equal Employment Opportunity Committee are, from left, Bob Mendoza, Gordon Prentice, Bernie Kulchin, and Cal Franklin.

Log Book Entries

Service Emblems

Service emblems due between August 16 and Aug. 31.

CONVAIR

Thirty-Five-Year: Dept. 143, Beverly A. Buffatt; 250, Roy A. Schultz.
Thirty-Year: Dept. 002, J. A. Villian; 027, L. V. Boles; 101, C. L. O'Rourke; 144, H. R. Franson; 221, A. W. Bailey; 223, E. H. Johnson; 401, F. W. Matern; 460, C. N. James; J. B. Johnson; 565, R. B. Miller; 731, R. Franklin; 756, R. L. Hines; 820, R. H. Feeley.

Twenty-Five-Year: Dept. 027, A. Castaneda; 130, K. A. Sears; 191, Mildred G. Herman; 250, S. Y. Johnson; 401, F. W. White; 511, E. B. Rutan; 515, G. P. Williams; 518, Edna V. Wayman; 700, Evelyn G. Gilger; 731, W. H. Hand.

Twenty-Year: Dept. 001, R. E. Scott; 015, R. L. Harr; 110, Helen A. Adesso; 151, R. W. Warwick; 221, W. E. Miller; Gilda L. Sandoval; 223, Yelma H. Dressler; C. L. Harger; 250, H. A. Buehler; R. B. Johnson; 400, C. H. Reeh; 511, H. A. Peterson; 565, Nellie R. Arellano; 566, R. P. Poston; 578, J. R. Hilliard; J. W. Ward; 962, H. J. Lomax Jr.; 959, J. P. Liston.

Fifteen-Year: Dept. 027, J. H. Mandl; 046, Alice M. Henry; 103, Jeanne M. Kramer; 130, J. W. Gelinas; 131, R. E. Keller; R. M. Lyons; C. S. Stevens; 141, R. E. Dubel; 142, C. W. Patterson; 191, J. D. Burns; 195, W. P. Bochart; Mary Lou Grant; 200, Marion E. Smith; 206, R. W. Emerson; 222, J. C. Brewer Jr.; Evalyn T. Edwards; 400, W. J. Gagne; E. Rincon; 401, S. Munoz; T. D. Schirtzinger; 511, C. F. Richards; 524, Carolyn P. Boody; Margaret P. Traupel; 531, G. A. Dethier; 572, H. R. Stone; 574, C. W. Weber Jr.; 595, R. W. Livesay; 756, W. L. Smith; 840, J. C. Barbieux; 950, R. J. Moberly; 954, F. S. Graham; 967, H. W. Riner; 979, J. J. Jensen; N. F. Lewis; R. T. Robbins; J. H. Sylvester Jr.; 935, R. C. Lynch; 987, W. G. Phillips; 988, W. T. Su, L. E. Thomas.

Ten-Year: Dept. 046, F. T. Mojado; 140, F. J. Dietz; 141, R. E. Doran; 191, Margaretta D. Johnson; 193, P. A. Diller; 250, F. J. Heneka; 401, C. Jordan; 551, D. S. McKinlay; 567, L. J. Havilan; 585, R. G. Huntington; 967, Irene E. Schulz; 979, A. Ramos; 986, B. L. McGrew.

ELECTRO DYNAMIC

Twenty-Five-Year: Dept. 612, H. G. Fisher.

Twenty-Year: Dept. 523, E. G. Frost.

Fifteen-Year: Dept. 391, R. W. Moll; 423, Z. A. Elgin, Alice C. Weller; 443, D. B. Sullivan; 447, W. D. Kurtz; T. Lazos; 449, Christine M. Ferrara; 637, R. T. Moran; 922, D. D. Olson.

Ten-Year: Dept. 416, P. E. Fuchs; 424, D. J. Webb; 652, P. E. Marenholtz; 924, L. M. Vlcek.

Awards

CONVAIR

Employee Suggestion Awards approved week ending Aug. 6:

R. S. Ahlgren, 220-0, \$15; J. F. Batchelder, 046-0, \$22.50; D. L. Blanchard, 979-4, \$25; L. S. Boland III, 015-0, \$15; G. L. Callahan, 046-0, \$122.30; R. E. Culver, 143-1, \$15; J. Danzl, 148-4, \$42; L. K. Denaco, 956-0, \$7.50; S. Ezakovich, 046-0, \$24.50; D. A. Falls, 149-7, \$15; A. M. Goldstein, 956-0, \$7.50; L. J. Grokoest, 144-1, \$15; L. R. Imbimbo Jr., 046-0, \$104.80; L. W. Jensen III, 221-1, \$15; L. A. Johnson, 400-3, \$15; Z. M. Johnson, 222-3, \$49.30; A. L. King Jr., 754-0, \$95.60; S. R. Kirchmann, 143-4, \$15; B. L. Kirk, 754-0, \$15; R. V. Lucero, 019-0, \$289.30; S. Mazzilli, 001-0, \$39; L. E. Morehouse, 149-7, \$15; S. Petty, 524-2, \$54.20; N. J. Phillips, 046-0, \$35.10; P. E. Rufing, 015-0, \$15; T. C. Smith, 491-0, \$15; R. C. Stewart, 572-2, \$23; B. J. Sullivan, 046-1, \$15; R. C. Thompson, 142-1, \$15; R. L. Westfall, 979-6, \$76.60; E. A. Simp, 046-0, \$43.50; J. H. Wines, 027-0, \$15; G. S. Ham, 046-0, \$15.50.

"Cost Reducers"

CONVAIR

Cost Reduction Achievement Award pins issued in July:

25-award pin—I. P. Mouet, 046-0. 10-award pins—J. F. Batchelder, 046-0; F. M. Church, 046-0; M. Vukelich, 144-1.

5-award pins—D. E. Koster, 759-0; J. G. Godfrey, 170-9; E. E. Miller, 046-0; F. O. Edwards, 143-0; T. R. Shattuck, 755-0; D. E. Evanson, 403-3; A. Avgerenos, 566-2; F. Sickler, 144-1; J. H. Wines, 027-0.

Rider-Driver

CONVAIR

RIDE/CARPOOL WANTED — From Madison and Mollison, El Cajon to Lindbergh Field plant, 7 a.m. to 3:30 p.m. shift. Call Louie Vogt, ext. 2768 LF or (home) 448-1260.

Retirements

CONVAIR

BROWN — Elmer L., Dept. 149-9. Seniority date Feb. 19, 1940, retired July 30.

CLARKE — Dr. Gilbert M., Dept. 130-0. Seniority date May 6, 1957, retired July 30.

FIELDS — George G. Jr. Seniority date Sept. 4, 1956, retired July 30.

FITZPATRICK — John D. Seniority date March 1, 1957, retired July 29.

HALLAM — Edward J., Dept. 222-1. Seniority date March 15, 1951, retired July 23.

HARRIS — Jeff H., Dept. 761-0. Seniority date Nov. 3, 1942, retired July 23.

HYDE — Henderson H., Dept. 400-1. Seniority date May 12, 1952, retired July 30.

JOHNSTON — William V., Dept. 046-0. Seniority date Sept. 22, 1965, retired June 8.

JONES — Alta S., Dept. 016-0. Seniority date Nov. 5, 1947, retired June 25.

KIPE — George B., Dept. 810-0. Seniority date Feb. 18, 1958, retired July 31.

KIRKPATRICK — Clarence, Dept. 149-4. Seniority date Oct. 31, 1966, retired July 19, 1971.

KOELLER — Ralph J., Dept. 761-0. Seniority date Dec. 13, 1946, retired July 30.

LARSEN — Magnus L., Dept. 223-3. Seniority date June 25, 1956, retired July 30.

LAY — Francis J., Dept. 046-0. Seniority date Sept. 27, 1951, retired July 9.

MINCH — Edward V., Dept. 046-0. Seniority date May 14, 1940, retired July 30.

MORGAN — Frank J., Dept. 533-2. Seniority date April 11, 1955, retired June 20.

NICHOLS — Cecil R., Dept. 401-0. Seniority date June 12, 1941, retired July 23.

O'CONNOR — Roger A., Dept. 250-2. Seniority date July 8, 1963, retired July 30.

PINKS — Dorothy R., Dept. 202-0. Seniority date Oct. 6, 1952, retired July 9.

POSEY — Lewis L., Dept. 142-1. Seniority date June 4, 1956, retired June 30.

QUICK — Lloyd A., Dept. 027-0. Seniority date Oct. 14, 1940, retired July 30.

RUPPERT — Walter, Dept. 508-0. Seniority date Jan. 29, 1962, retired July 30.

RUTKAUSKAS — John S., Dept. 545-0. Seniority date June 18, 1957, retired July 30.

SHAFER — Glenn G., Dept. 562-0. Seniority date May 9, 1956, retired June 26.

SOUTHWICK — Mary F., Dept. 979-0. Seniority date Feb. 12, 1963, retired July 23.

SZAKACS — Joseph J., Dept. 566-3. Seniority date March 8, 1937, retired July 30.

WALSH — John, Dept. 833-1. Seniority date March 11, 1940, retired July 30.

ELECTRO DYNAMIC

JANCSI — Julius. Seniority date Dec. 19, 1955, retired July 30.

NEWMAN — Margaret B. Seniority date Jan. 4, 1956, retired July 12.

PEDERSON — Gladys A. Seniority date Oct. 18, 1949, retired June 28.

TAUNTON — Betty M. Seniority date May 14, 1956, retired July 30.

Personals

EASTERN TEST RANGE

I wish to extend thanks to General Dynamics, the employees and Local 610 for their kindness at the recent passing of my mother.

Michael Trbovick,
Dept. 979

CONVAIR

Thanks to all my many friends at Convaair for the wonderful send off dinner and presents upon my retirement.

J. J. Szakacs
Dept. 566-3

* * *

I wish to thank all of the kind friends at Convaair for their sincere and generous expressions of sympathy following the death of our son, Daron.

Bob Backon
Dept. 150-0

* * *

The kind expressions of sympathy from all who knew my husband so well have been very comforting and deeply appreciated by me and my family since his recent death. It is gratifying to feel that his loving deeds will continue to live in the hearts of others.

Mrs. Francis J. Bourgeois

* * *

My sincere thanks to all of you, particularly the estimating department and Management Association, for the many kindnesses prior to and after the death of my beloved wife.

Ralph J. Culver
Retiree

Equal Employment Committee Formed

An Equal Employment Opportunity (EEO) Committee has been established by Electro Dynamic Division's Electronics operation to meet monthly to help formulate and carry out the operation's Affirmative Action Program for 1971.

Members are Gordon Prentice, director of operations; Cal Franklin, engineering department; Bob Mendoza, controller's department; and Bernie Kulchin, director of industrial relations and EEO compliance officer.

Kulchin said the committee will review any discrimination complaints received from employees and requests from minority employees for counseling. It also will make recommendations on action needed for Affirmative Action Program objectives to be met and on action that may be taken to increase the company's participation in community affairs.

One of the committee's first projects was to develop a Skills Bank program wherein minority employees with the Electronics operation will be interviewed to determine their qualifications for promotional opportunities.

Under this program, which began Aug. 5, counseling will be provided to assist minority employees in obtaining additional training, education, or experience they may need for advancement.

In order to increase the number of minority applicants and new hires, the EEO committee has developed a list of "job agents" who serve as representatives of the minority community. When job opportunities occur, these "job agents" may provide job applicant referrals to members of the industrial relations department.

The committee is planning career counseling programs in which students at Lincoln and Mt. Miguel High Schools will be briefed on employment processing and will receive counseling on specific careers within the electronics industry.

Kulchin said the committee has arranged for representatives of the minority community to make a presentation to the vice president and general manager and his staff concerning Affirmative Action plans and the role of the community and the Electronics operation in achieving its goals.

The committee also has arranged for the Electronics operation to receive several minority-related publications.

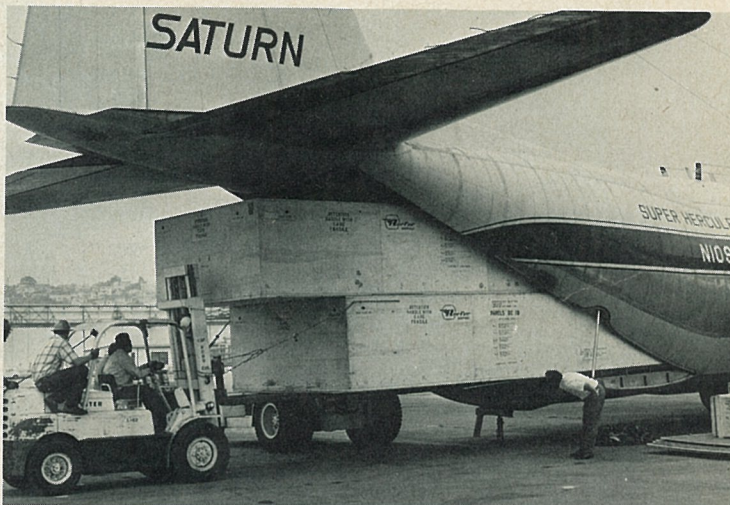
Toastmasters Elect Durwood English

Durwood English, estimating supervisor for Convaair Aerospace-SD, was elected to the board of directors of Toastmasters International during its 40th annual convention early this month in Calgary, Alberta, Canada.

English was among 1,000 delegates at the convention. He is a member of Mt. Helix Toastmasters Club 126-5 and is past governor of Toastmasters District 5.



CLUB COMMAND—New officers of Electro Dynamic-SD Management Club, from left, are (front row) L. Ferris Bell, vice president; Vito Sardo, president; Hank Honchor, second vice president; and Pete Weston, treasurer; (back row) George Trivoli, secretary; Lee Blackwell and Phil Teeter, board of control members. Bill Doroshuk also was elected to board of control but was not present for picture.



PANEL PEERING—Crate containing 1,000th Aerfer-fabricated panel for Convaair Aerospace-SD use in DC-10 fuselages is unloaded from cargo plane (top photo) after air shipment from Italy. Looking over panel (lower photo) are, from left, W. C. Buxton, purchasing agent; H. E. Moose, director of material; Oscar Cinquegrani, Aerfer managing director; J. M. Adamson, director of operations; Gen. Adolfo Varini, Aerfer commercial director; E. V. Carosella, Convaair Aerospace contract administrator at Aerfer; and P. L. Manetti, Aerfer U.S. liaison manager.

1,000th Panel for DC-10 Fuselages Arrives from Italian Subcontractor

Officials from Aerfer Industrie Aerospaziali Meridionali near Naples, Italy, were at Convaair Aerospace-SD's Lindbergh Field plant recently to negotiate changes in their subcontract for fabrication of panels for use in DC-10 fuselage sections.

Included were Oscar Cinquegrani, managing director, and General Adolfo Varini, commercial director of the Italian firm.

The visit coincided both with uncrating of the 1,000th panel produced by Aerfer under the Convaair Aerospace subcontract and ceremonies in Long Beach in which the first two DC-10s were delivered by McDonnell Douglas to American and United Air Lines.

Accompanying the visiting executives were E. V. Carosella, Convaair Aerospace subcontract administrator at Aerfer, and P. L. Manetti, Aerfer liaison manager in the U.S.

Aerfer, under the subcontract, builds panels for use in the top section of the DC-10 fuselage and right and left side panels including window and door cutouts. Most of the panels are shipped to New York on ocean liners then are trucked to San Diego.

Will Buxton, purchasing agent for major DC-10 subcontracts, said the 1,000th panel is destined for use on DC-10 ship No. 35 which also has been ordered by United.

Aerfer later this year is scheduled to become part of the new Aeritalia government-supported aircraft industry in Italy.

Convaair Aerospace-SD has four employees, including Carosella, assigned to the Aerfer plant in Italy. Others are Pete Nico of Dept. 850-0, resident office manager; Herb Mishler of Dept. 140-2, reliability project administrator; and Ralph Steele of Dept. 144-3, outside inspection representative.

Engineering Dept. Realignment Set

Department heads have been appointed in Convaair Aerospace Division's new single engineering department, which will be functionally similar at Fort Worth and San Diego, announced R. H. Widmer, vice president-research and engineering.

The following will report directly to Widmer: W. W. Fox, Project Engineering—San Diego; F. A. Curtis, Project Engineering — Fort Worth; T. S. Webb, Aerospace Technology; J. E. Goode, Systems Technology; W. C. Dietz, Structures and Design; J. M. Wild, Laboratories and Test; F. E. Armstrong, Advanced Design; R. H. Schwarz, Administration; and E. B. Maske, Tact/Tart program director.

"By forming a single engineering department," Widmer said, "we are in a position to cope better with today's shrinking aerospace budgets, shifting markets, diversification, and technology utilization."

Con-Trib-Club Awards \$13,500 to 13 Civic Groups

Convaair Employees Con-Trib-Club committee in recent meetings approved grants totaling \$13,500 for 13 health and community service organizations in San Diego County.

Included were Multiple Sclerosis Society, \$1,500; Crossroads Foundation, \$750; Action Center, \$1,000; Cerebral Palsy Foundation, \$1,000; Cystic Fibrosis Research Foundation, \$1,500; Epilepsy Society, \$1,000; Diabetes Association, \$500; Tuberculosis and Health Association, \$1,000; Aseltine School, \$500; International Guiding Eyes, \$1,500; United Jewish Federation, \$750; Family Service Association, \$1,000; and City Rescue Mission, \$1,500.

General Dynamics is an Equal Opportunity employer.



PRETTY PROFESSIONALS—Typical of 24 salaried women employees holding key professional positions with Electro Dynamic-SD are, from left, Esther Mayfield, Dorothy Page, Dorisann Tarver, and Alice Robinson. All have outstanding educational and employment records.

Salaried Women Have Key Roles At Electro Dynamic Operation

Electro Dynamic Division's Electronics operation may have established a record for General Dynamics operating units by increasing its number of salaried women employees by 600 per cent during the past six years.

"We've been fortunate to recruit some of the most outstanding young women college graduates and graduate engineers in the country," said Vince Finley, senior professional placement representative.

George Leesch, manager of personnel and compensation, said all of the operation's current 24 salaried women employees hold key positions in engineering, management systems, finance, and other technical, management, and supervisory areas.

A "look" at Electronics' newest salaried women employees proves that attractiveness and intelligence can be combined in the same "personal package."

Esther Mayfield, a new engineer in Dept. 811's operations research group, earned her Master of Science degree in electrical engineering at San Diego State College in June—just one year after receiving her BS with distinction in physics. She was the first woman ever to receive the MSEE from the college.

Because of her outstanding scholastic record (straight As in physics), she had been granted permission to begin graduate studies concurrently with her undergrad work. She also was an officer of the college's Sigma Pi Sigma and Society of Physics Students chapters.

Married to an aeronautical engineer, she formerly was employed by TRW and studied political science at the University of Colorado. She is also an artist (oil and water color) and pianist and an avid golfer and gourmet cook.

Alice Robinson, new computer hardware and software pro-

grammer for Dept. 639 support systems electrical engineering, ranked first among all graduates in the University of New Mexico school of engineering when she received her graduate degree in electrical engineering with distinction this spring.

She had a perfect 4.0 (A) grade point average for her graduate work although more than 20 years had elapsed since she received her BS magna cum laude from the University of Tampa in 1949.

Mrs. Robinson formerly had been employed as a digital computer specialist for the Naval Command Support System, an engineering programmer analyst for General Electric, a programmer for Data Dynamics, and a technical staff associate for Sandia Corp.

Dorisann Tarver, new financial analyst in Dept. 105's accounts receivable section, received her degree in accounting and business administration in May from Prairie View A&M College in Texas where she also had been employed in the personnel and admissions office.

She chose Electro Dynamic for employment after her husband, a Navy ensign, had been assigned a tour of duty as a supply officer at North Island NAS. She makes most of her own clothing, enjoys tennis, and is a San Diego Chargers fan.

Dorothy Page, a 20-year General Dynamics veteran and configuration control specialist in ED's management systems Dept. 116 for 1½ years, may be "typical" of the operation's longer-term salaried women.

A native San Diegoan, she formerly served with Stromberg Datagraphix as a program control analyst and with Convair as an engineering writer, master scheduling analyst, technical writer, field service representative, engineering release clerk, parts release man, and departmental clerk.

As Convair's only woman field service representative, she had assignments at Atlas missile sites, Air Force bases, and subcontractor firm plants that required travel for the company throughout the U.S.

Miss Page earned her degree in business management from San Diego State in 1968 after nine years of evening studies. Cost of her college education was reimbursed through the company's tuition refund plan.

Electronics operation's other salaried women personnel and their assignments and departments include:

Patti Lucas, financial analyst, 108; Ruth Hayward, senior engineer, 811; Theresa Gonzales, engineering illustrator, 424; Mary Anderson, management systems analyst, 106; Christina Renken, electronic data processing programmer, 106; Mary Adam, engineer, 638; Flora Garth, senior cost estimator, 109; Elizabeth Gerding, senior executive secretary, 100; Jennie Williams, manufacturing control project analyst, 526; Joan Sjoblom, engineer, 638; Joanne Nay, manufacturing development engineer, 429; Dorothy Ridley, engineering illustrator, 712; Jamie Swanson, engineering illustrator, 712; Naomi Adams, office services supervisor, 391; Joan Vance, operations administration analyst, 391; Vicki Allen, financial analyst, 105; Ivy Oliver, financial analyst, 105; Irene Duzyk, senior financial analyst, 105; Gloria Cooper, industrial relations analyst, 102; and Barbara Miller, electronic data processing programmer, 106.

CRA Calendar

(For information on CRA activities call CRA headquarters, ext. 1111 KM. Deadline for next issue of GD/World is Aug. 24. Call ext. 1071 LF or 3322 KM. All meetings are held in CRA Clubhouse unless otherwise noted.)

★ ★ ★

ADVENTURERS—Meet 7:30 p.m., tonight, Aug. 18.

BADMINTON—Call Al Van Norman, 222-4867, for information.

BICYCLE CLUB—Rides scheduled Aug. 21 & 29. Call Bob Williams, ext. 1626 KM for information.

BOWLING—Management winter leagues now forming, call H. Lund, ext. 1123 LF.

BRIDGE—Duplicate bridge session, 7:30 p.m. each Friday.

CERAMICS—Meet 9 a.m.-noon and 7-10 p.m., Tuesdays and Thursdays.

CHORUS—Rehearsals 7:30 p.m. each Monday.

COUNTRY & WESTERN MUSIC—Meet 7:30 p.m. each Thursday, CRA Missile Park picnic shelter.

DELTA DIVERS—Spearfishing and abalone dive Aug. 22 off La Jolla.

FENCING—Workouts and instruction 7:30 p.m. each Friday. YWCA, 10th & C Sts.

GUN CLUB—Fun shoot, 9 a.m., Aug. 29, Gillespie Field gun range.

HEALTH CLUB—Open 9:30 a.m.-10 p.m., Monday through Thursday; 9:30 a.m.-9 p.m., Fridays; 9 a.m.-noon, Saturdays; "women only" weekdays, 9:30-11 a.m.

ICE SKATING—Big Bear Lake weekend, Sept. 10-12. GD family skate night 6:15-7:45 p.m. each Thursday. House of Ice, Interstate 8 and Lake Murray Blvd. Flat rate fee \$1. (includes skates).

JUNIOR SCIENCE—Meeting 7:30 p.m. Aug. 20.

MINIATURE RAILROAD—Operating sessions Saturdays, Sundays, and holidays, CRA Missile Park.

MODEL HO RAILROAD—Work sessions 7 p.m., each Tuesday, CRA Missile Park.

PISTOL CLUB—Shoot 9:15 a.m., Aug. 22, Police Pistol Range.

RADIO CLUB—Pancake breakfast, 8 a.m., Aug. 22, CRA Missile Park.

RIFLE CLUB—Meeting 7 p.m., Aug. 25.

ROADRUNNER—Meet 7:30 p.m., Aug. 26, Gillespie Field Clubhouse.

SAILING—Meeting 7:30 p.m., Aug. 25.

SCULPTURE—Workshop sessions 7:30 p.m. each Monday.

SKI CLUB—Water skiing each Wednesday 5 p.m., Crown Point landing.

SQUARE DANCE—Dance 8 p.m. Thursdays.

STAMP CLUB—Meeting 7:30 p.m., Aug. 26.

SWIMMING—Family swim night 7-9 p.m., Aug. 21, Mission Beach Plunge. Tickets at employee benefits, 5 cents.

TOASTMASTERS—Convair Toastmasters meet 4:30 p.m. each Wednesdays. Dynamic Toastmasters meet 5:30 p.m. Thursdays.

Skaters Slate Weekend At Big Bear Lake Resort

CRA Ice Skating Club's annual autumn weekend for all interested General Dynamics employees and their families will be Sept. 10-12 at Big Bear Lake.

Cost of \$16 (\$8 for children under eight) will include two nights lodging and five meals at Wawona Lodge. Activities in the area include ice skating, bowling, fishing, horseback riding, and a scenic chair-lift.

Reservations must be made by Sept. 3 through employee benefits offices or the CRA Clubhouse. Additional information can be obtained by phoning Cal Kosen, ext. 1924 KM, or Joan Kosen, 274-5227.

Scavenger Hunt Yields Varied Ocean Creatures

Loren Batchman took top honors at CRA Delta Divers scavenger hunt Aug. 11 by bringing in 33 items including abalone, starfish, sea urchins, kelp snails, chestnut cowery, welks, and key-hole limpids.

Seventeen Delta Divers competed with Roy Rogel placing second and Bill Howard third. Many tourists gathered to view the catches.

Eskenes, Ballowe Win In ETR Golf Outing

Flight net winners at Convair Aerospace Eastern Test Range Golf League's eighth round of 1971 last month at John's Island were:

Gold flight—Hank Eskenes, 63; John Mazza, 76, and Digger Ljungquist and Elmo Mattoon, 82.

Blue flight—Harry Ballowe, 81; Tom Weber, 82, and Sam Carlile, 83.

Weber, the ETR golf commissioner, said the tournament was the best the league ever had. "The course was excellent and the hamburger fry and beer blast for families of the golfers held later at Sebastian Inlet was tremendous," he said.



SHOW SAMPLES—Art Wrightson and Grace Wright look over two of about 50 entries to be displayed from 10 a.m. to 5 p.m. Sunday (Aug. 22) at CRA Sports Car Club's car show in Missile Park. Shown are Wrightson's 1968 "E" Jaguar and Mrs. Wright's 1919 Buick touring sedan. Spectators will select the "most desirable car" and 27 other awards will be given to entries judged best in nine classes by professional judges. All General Dynamics employees have been invited to enter vehicles in the show.

Ski Club Buys New Tow Boat, Plans Party for Prospective Members

Convair's snow and water ski club has purchased a new 16-foot Tahiti-hull boat and 125-hp motor to double its capacity for providing tow service for water skiers at the club's Wednesday evening and Sunday outings at Mission Bay.

"The ski club offers an ideal way to enjoy the sun and get good exercise at the same time," said Art Mason of Electro Dynamic-SD, water ski vice president for the club.

"The new boat, coupled with our 1970 16-foot Reinell with its 85-hp motor, enables employees and their families to enjoy as much skiing as desired without the cost of purchasing and maintaining a boat."

Prospective new members have been invited to a club beach party and steak fry from noon to sunset Aug. 29 at Crown Point on Mission Bay. The Convair-Don Diego Ski Club banner will mark the location.

Free skiing and instruction for beginners will be provided along with beer and soft drinks throughout the afternoon. Steaks with all the trimmings will be \$5 (and may be divided for children 12 and under).

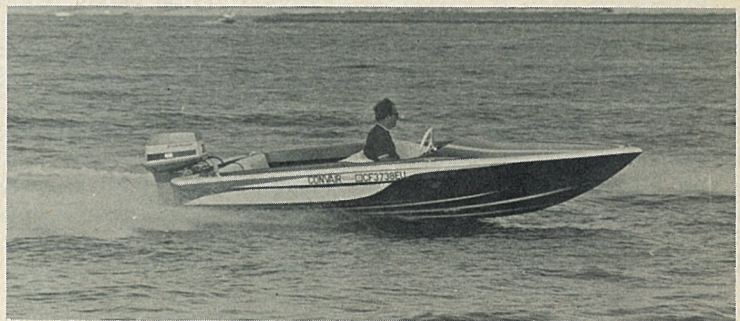
Fast-Paced Youth Show Set by Mgt. Association

Convair Management Association will present "A Night With Our Young Americans," Sept. 17 in the Mission Bay Room of the Bahia Hotel.

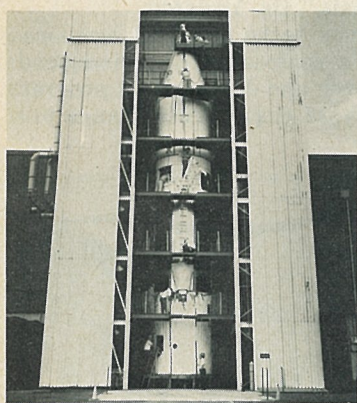
A fast-paced show will be presented by "The Bright Side," a 27-member group of 12 to 19 year old singers, dancers, and musicians from throughout San Diego County. Stary Gange, a Visalia civic leader, will present an inspirational talk on Americanism.

A Hawaiian vacation for two via United Air Lines with accommodations at Hilton Hawaiian Village and other "travel packages" will be awarded to benefit the Management Association's scholarship fund.

The meeting will be sponsored by the Convair Aerospace-SD material department. Social hour will be at 5:45 p.m. with breast of spring chicken cordon bleu dinner at 7. Tickets are \$4 for members and \$5 for others.



BAY RUN—Bob Vogel, past president, takes Convair Ski Club's new 16-foot tow boat on first trial spin around Mission Bay. Steak fry and beach party with free skiing is scheduled Aug. 29 for prospective new members.



TOWER TEST—Centaur vehicle for Atlas-Centaur 28 launch of Intelsat IV satellite undergoes mechanical fit and pyrotechnic electrical checks with split barrel, split fairing, and interstage adapter in Vertical Assembly Tower at Kearny Mesa plant. Employees, left to right from top, are Art Oldrich, Edgar Ulsund, Ray Ponchetti, Ron Hunt, Glenn Hendrix, Gordon Evans, Stan Miller, Rudy Gallego, Roy Voosen, W. N. Beers, and Gerry Christ.



REDEYE MILESTONE—Presentation of a Redeye model at Army Missile Command, Huntsville, Ala., last month by W. J. Morrow, vice president and general manager of Pomona operation, noted six years' production of the weapon system at Pomona. From left: Brig. Gen. Louis Rachmeler, deputy commanding general of Army Missile Command; E. K. Charlton, former deputy project manager for Redeye; and Morrow.

"GD Headquarters"...

(Continued from Page 1)

of French pioneers up the Mississippi from New Orleans to carve a settlement out of the wilderness. Established in 1764, the original St. Louis was a fur trading center.

The packing and shipping of furniture, fitting furniture into the new accommodations, installing the new Stromberg-Carlson CROSSREED telephone system, re-staffing and the myriad of other details involved in such a Corporate move adds up to an undertaking of no small proportions.

Indicative of the care in planning is the fact that the relocation was publicly announced Feb. 11.

On April 1, the plan was approved for occupancy of floors 15, 16, 17 and 23 in the new Center and on May 15 the 15th floor was occupied and in full operation.

Furniture transfer involved loading

SAVINGS, STOCK PLAN 'OPEN' DURING AUGUST

Investors in General Dynamics Savings and Stock Investment Plan are reminded that Aug. 31 is deadline to make changes in options or apply for enrollment. Changes will become effective with the next quarter, starting Oct. 1.

Employees who have established eligibility by being with the Company a full year can sign during August for membership. Additionally, present members of the Plan wishing to either change their investment option or percentage of savings can also make application this month.

People Mobility

Personnel Transfers Within GD

(Following are recent personnel transfers within General Dynamics. In parentheses are dates when individuals joined the company.)

EUGENE FITZSIMONS (1939) from Convair Aerospace Division - San Diego to principal configuration control specialist, Electro Dynamic Division - San Diego; THOMAS E. PERRY (1968) from ED-Pomona to ED-SD as quality control engineer; THOMAS D. WATSON (1963) from Stromberg-Carlson, Rochester to foreman, S-C-Orlando; HOMER E. BOYD (1950) from Convair-FW to Corporate Headquarters, St. Louis; PETER K. CONNOLLY (1968) from Electric Boat to Corporate Headquarters as public relations representative; GERALD F. ANDRUS (1966) from ED-SD to logistic support engineer, Convair-FW; WILLIAM B. BARTH (1940) from Convair-SD to general foreman, ED-SD; JOHN A. ANDERSON (1968) from Quincy Shipbuilding to EB as senior design engineer; WILLIAM L. WHITE (1956) from Convair-FW to Convair-SD; LESTER DASSOFF (1956) from Convair-SD to quality/reliability specialist, ED-SD; JERRY L. WATKINS (1969) from Convair-FW to Corporate Headquarters; THOMAS E. CONDRON (1968) from Quincy to EB as program planner; LELAND G. JOHNSON (1967) from Convair-FW to Convair-SD; ROBERT PAGE (1958) from Quincy to engineering assistant, EB; DAVID W. CLARK (1968) from Convair-FW to Corporate Headquarters; JERRY R. JONES (1948) from Convair-FW to Convair-SD; THOMAS F. GORDON (1969) from Convair-FW to Corporate Headquarters; LEONARD D. SKELTON (1950) from Convair-FW to Convair-SD; JOHN A. ROGERSON (1948) from Convair-FW to Corporate Headquarters; GARY P. MIMS (1965) from Convair-FW to Convair-SD; LEE P. ORR (1948) from Convair-FW to Convair-SD.

on Thursday in New York after 5 p.m. and unloading at the new building the following Sunday at 8 a.m. This schedule applied on four successive weekends.

Indicative of better utilization of space is the fact that the new location houses 220 people in 50,000 square feet contrasted to the 70,000 square feet in Rockefeller Center occupied by 200 people.

The re-staffing job was expeditiously handled by the Industrial Relations Department. Only 60 of the present 220 employees at headquarters made the move. The majority of those not moving were secretaries and clerical employees. Industrial Relations representatives visited St. Louis and Clayton in advance of the move to establish contacts with secretarial employee candidates. This simplified the task of interviewing and hiring secretaries on the part of incoming management and staff personnel.

The new Headquarters is ideally situated for ready access to General Dynamics plant cities. In fact, Pierre Laclède Center is 20 minutes from St. Louis International Airport where excellent air service is available to all division and subsidiary locations as well as to customer plants and offices.

Industrial Relations, Public Affairs, Technical Programs and Planning, and International Department personnel occupy the 15th floor while the 16th floor houses Administrative Services, Contracts, Cost Estimating, Material, Manufacturing and Facilities Departments.

The 17th floor is occupied by the Financial and Accounting operations—Treasurer, Comptroller, Audit, Payroll and Cashier. The 23rd and top floor houses the Executive Offices.

Promising Future Predicted For Liquefied Natural Gas as Fuel

(Following is the first of a three-part series on liquefied natural gas. Quincy Shipbuilding Division is investigating the prospects of building ships to transport LNG.)

Natural gas is one of nature's purest forms of energy. It is clean, economical, efficient, and dependable. It has no color, you can't smell it—but if you mix it with air it packs a big punch.

It is primarily methane with small concentrations of ethane, propane, etc. Developed millions of years ago by the decomposition of animal and vegetable matter under pressure and temperature, it is generally found in porous rock, deep underground.

Natural gas has been known to man for a long time. The Chinese used it 2,000 years ago to evaporate salt brine—piping it through hollow bamboo tubes. It was known in this country in 1775, but until the 1930s—when it became possible to transport it safely—it was a nuisance.

Today natural gas accounts for about 32 per cent of U.S. energy. Some 20 trillion cubic feet are burned each year, and with the demand growing at the rate of 6 per cent annually, there is a nation-wide scarcity.

LNG, or liquefied natural gas, is a liquid form of the same kind of natural gas—but it has been chilled to -260°F. In this state it is a clear, odorless liquid resembling water, but now it occupies only 1/600th of the volume that natural gas would at room temperature. Now it is easy to handle, store, and ship. Its weight is approximately half that of water.

The changing of this gas to a liquid is a "cryogenic" process—cryogenics being the science of the super-cold. Liquefaction dates back to about 1830

when British scientists first were able to liquefy a gas.

LNG should not be confused with LPG (liquid petroleum gas). Although the latter is a fuel, it is more expensive and less available than LNG. LPG is mostly propane or butane, and it is recovered during the process of refining crude oil.

In addition to being an ideal fuel since it is clean, compact, and eminently portable, LNG has many other advantages. When used in place of fuel oil or gasoline there is a significant reduction in the air pollutants. It is also easily stored in much smaller containers than are required for the gas itself.

Entirely aside from the use of LNG to supplement regular gas fuel demands, LNG has a virtually unlimited future. Being portable, it can be easily transported to areas where pipelines do not exist, such as trailer parks, where today there is space for more than one and three-quarter million mobile homes. It also is a low pollutant fuel. Already motor vehicles run on LNG with 50 per cent less smog-producing emissions than from gasoline fuels. Over 50,000 urban transit buses in the nation could use LNG with a great reduction of pollutants in their exhausts. Studies have shown it could be a fine fuel for aircraft. LNG has about 15 per cent more energy per pound than today's jet fuel. And it already has broken into the marine and railroad transportation fields.

But its further use in these fields depends upon growth of gas supplies.

Fort Worth Awarded NASA Contract To Evaluate Inspection Technique

Fort Worth operation has won a Phase I contract from National Aeronautics and Space Administration to evaluate a new signal-counting technique used with delta-scan inspection.

In delta-scan inspection an ultrasonic sound beam from one transducer is sent at an angle into the metal part. Another transducer records the amplitude, or strength, of the sound beams.

A strong amplitude reading generally indicates a flaw in the metal part.

The new method uses the same basic testing equipment, adding only a modified frequency counter. But instead of reading the amplitude of ultrasonic

sound beams, the new technique calls for counting the number of oscillations during a specific time period.

"The greater the number of oscillations, the more likely we've found a flaw," said Dr. B. G. W. Yee, project research scientist, who helped develop the new technique. The oscillations are "weighted" so that those with greater amplitude produce more counts.

Dr. Yee said the new signal-counting technique is more sensitive and potentially adds a "new dimension of reliability" to the already effective delta-scan inspection technique.

The new technique has another advantage in that the signals can be fed directly into a digital computer.

"We hope to be able to provide a permanent record of an inspection in compact form, and provide easy access for computer analysis and storage of flaw signals," Dr. Yee said.

This new technique was developed through a company-funded independent research and development program and an F-111 engineering change proposal.

"DC-10"...

(Continued from Page 1)

hour aircraft display.

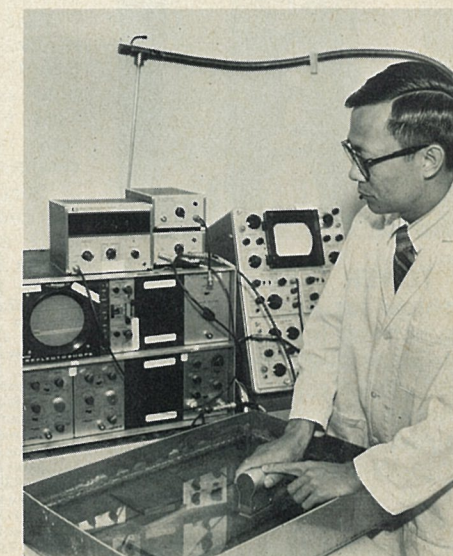
American Airlines inaugurated first commercial service with the DC-10 Aug. 5 between Los Angeles and Chicago—only one week after taking delivery of the aircraft at Douglas' plant in Long Beach. Officials said crew and passenger response has been excellent.

The first two of the new wide-bodied transports with Convair Aerospace Division-built fuselages had been delivered to American and United Air Lines in joint ceremonies July 29—two months ahead of the original delivery schedule.

Federal Aviation Administration certification authorizing passenger operation of the new transports was presented at the delivery ceremonies—just 11 months after the maiden test flight.

John H. Shaffer, FAA administrator, called delivery of the first DC-10s "a great day in aviation" represented by "a combination of a great airframe and a great engine."

Secor D. Brown, Civil Aeronautics Board chairman, said the nation should feel "enormous pride" in the achievement represented by the DC-10. "There are thousands of hands and hearts that went into this truly magnificent machine," he commented.

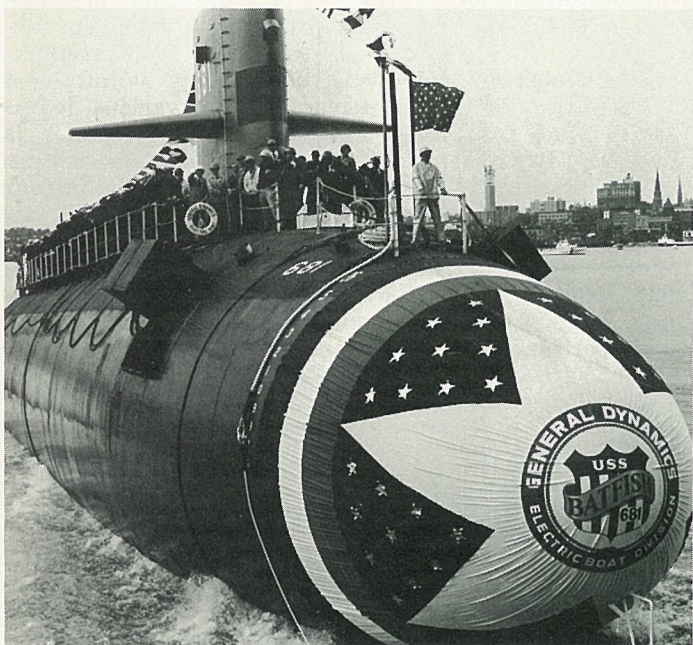


SCANNING—Dr. B. G. W. Yee, project research scientist, checks out new signal-counting technique used with delta-scan inspection procedure.

General Dynamics World

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GENERAL DYNAMICS CORP. — SAN DIEGO 4178 November 1, 1971



NUCLEAR FISH—Nuclear attack submarine 'Batfish' slides down ways into Connecticut's Thames River after Oct. 9 christening at Electric Boat Division in Groton. In right photo, sponsor of 40th nuclear sub built by company, Mrs. Arthur R. Gralla, wife of Navy's Military Sealift



Commander, is congratulated on successful christening effort by GD President Hilliard W. Paige, foreground, and Electric Boat General Manager Joe Pierce. At left are U.S. Sen. Lowell P. Weicker, Jr., (R-Conn.), keynote speaker at the launching ceremony, and Adm. Gralla.

Nuclear Submarine 'Batfish' Christened in Groton Ceremonies

The nuclear attack submarine *Batfish*, 11th Sturgeon-class sub to be built by Electric Boat Division, splashed into the Thames River at Groton, Conn. Oct. 9. She was christened by Mrs. Arthur R. Gralla, wife of Vice Adm. Gralla, Commander Military Sealift Command, who accompanied his wife. Mrs. Arthur R. Gralla, Jr., assisted her mother-in-law as matron-of-honor.

Speaking to the youth in an audience of 3,000, Sen. Lowell P. Weicker, Jr. (R-Conn.) said that *Batfish* symbolized the freedom which makes it possible "for you to care, for you to be idealistic. She makes certain, as did hundreds of ships before her, that parents can live for their children, rather than fighting to live.

"What the launching of the USS *Batfish* says is that you are really important. If you can act and think in freedom, then your world will be the product of idealism rather than fear.

"I know that it's hard to figure out who's telling the truth these days when some Americans say kill and some say crawl," he concluded. "The great achievements for mankind weren't accomplished at the end of a gun or on one's stomach. They were achieved by free men standing tall and thinking kind. That's why it has to be a *Batfish* and you."

Mrs. Gralla and Weicker were introduced by Hilliard W. Paige, General Dynamics president, who noted that *Batfish* was the product of not just an excellent labor force, but an outstanding management team. "This yard has been blessed with a succession of the best shipbuilding leadership, from L. Y. Spear to O. P. Robinson to Carl Shugg and now Joe Pierce," Paige emphasized. "These men, each in his time, represented the

(Continued on Page 2, Col. 4)

Howard Kirst Named To Corporate Position

Howard M. Kirst, formerly president of Kirst and Associates, a Chicago consulting firm, has been appointed to the new position of Director of Corporate Planning, Chairman David S. Lewis has announced.

His assignment includes advising and assisting corporate and division



Howard Kirst

management in developing plans and strategy; directing the planning for the introduction of new products as well as improved market penetration of existing products. He will also be responsible for corporate diversification programs and for providing information and guidance with respect to general economic, industry and market conditions that affect the corporation's near-term and long-term future.

Kirst holds a BS from the University of North Dakota and an MS from New York University.

He joined Honeywell, Inc. in 1951 as marketing research manager and in 1958 became Honeywell's corporate compensation planning manager.

In 1959 he joined a Chicago-based management consulting firm as a vice president and three years later established Kirst and Associates, Inc.

International Overview Given During SD Meet

Convair Aerospace Division's San Diego operation was host recently for a General Dynamics international operations conference.

Held at Convair's Kearny Mesa Plant, the three-day meet brought together representatives from overseas offices, corporate headquarters and from divisions and subsidiaries.

The conference served to extend a broader overview of general market analysis and trends, new business opportunities and the exploration of current and proposed international marketing approaches.

The San Diego conference followed a series of similar meetings at corporate headquarters in St. Louis.

J. T. Hayward, corporate vice president-international operations, directed the conference.

FIRST F-111 MODELS EQUIPPED WITH MARK II's DELIVERED TO AIR FORCE

F-111Ds equipped with the Mark II avionics system — most advanced avionics system ever flown on a U. S. military aircraft—are now being delivered to the Air Force.

The "D" model is also equipped with new TF30-P-9 engines, which enable the aircraft to carry a greater payload and perform better throughout its flight envelope.

The Mark II avionics system will enable the F-111D to navigate even more precisely than earlier tactical models. And it will give the new

model a greater capability to detect and destroy targets—on the ground or in the air.

In addition, the Mark II's multi-sensor display will provide crewmen with "television screens" which present in simplified visual form all of the information contained on the aircraft's cockpit panels.

"On a bombing run, for example, the crew needs to know the altitude, speed, fuel distribution, distance from target, and other facts at a given moment," said A. S. Witchell, an F-111 program director. "Normally, the crew would have to look at a half dozen or more different instrument panels to get this data. But using the new display, they get all this information on the screen in front of them.

"This is the first system of its type to be installed in any aircraft. It will not only enhance the crew's ability to make decisions, but reduce the margin for error in these decisions."

Other models of the 111—the A, E, F and FB—are already equipped with avionics systems that are more advanced than anything flying.

"But the Mark II is even more sophisticated," said Witchell. "It definitely puts the F-111D in a class all by itself in avionics capability.

"This system extends the state of the art and will no doubt serve as the basis for future aircraft systems."

(Continued on Page 3, Col. 1)

ALARM Surveillance System Being Tested Aboard Helicopter

A new battlefield surveillance system is now being flight tested for the U.S. Army by GD's Electronics operation.

Being flight-tested is an 18-foot-long, cigar-shaped radar antenna mounted on the underside of a modified Bell helicopter.

The program is to demonstrate the feasibility of an airborne surveillance system, dubbed ALARM for Alerting Long-Range Airborne Radar for Moving targets.

The ALARM system would ultimately consist of a helicopter carrying a moving target indicator (MTI) radar, a ground display station and a data link between the two.

The work is being done by the Electronics operation, San Diego, under a \$1.3 million contract from the Army's Electronics Command, Fort Monmouth, N. J. The alarm system was part of a General Dynamics display at the annual meeting in Washington, D.C., of the Association of the U.S. Army.

Burns Dies Suddenly

H. S. M. Burns, a director of General Dynamics Corp. since 1962, died of a heart attack Oct. 21.

A veteran executive of the oil industry, Burns joined Shell Oil in 1926, became president and chief executive officer in 1947 and chairman of its executive committee in 1953. He retired from Shell in 1960.

A native of Scotland, Burns was educated at Aberdeen University and Cambridge University.

Contract Awarded to Update Standard ARM

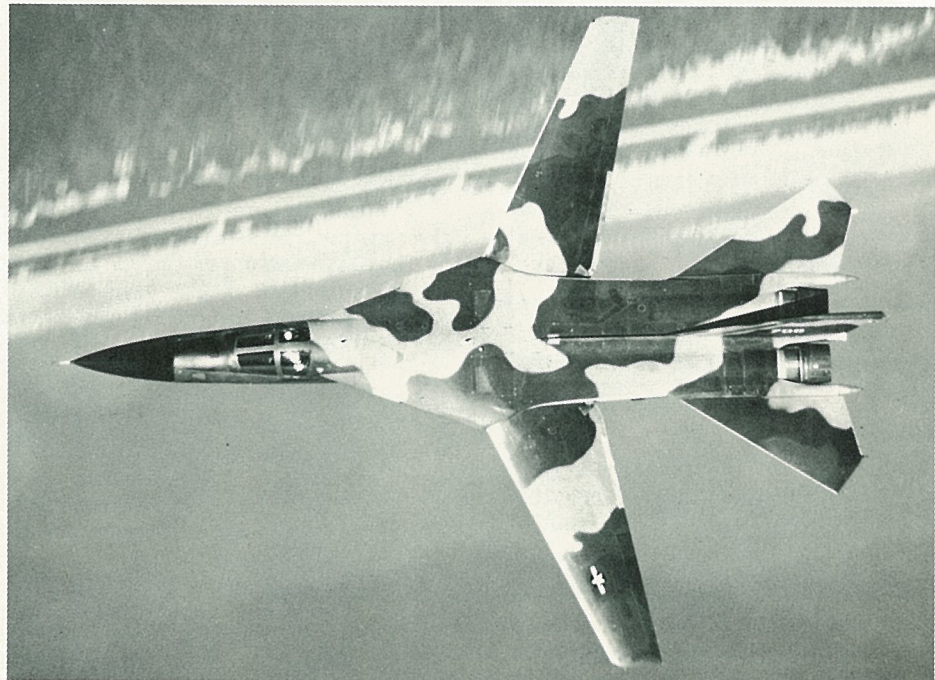
The U.S. Navy has awarded General Dynamics \$3,675,435 to update early version Standard ARM missiles. Standard ARM is an air-launched guided missile system that locates and destroys hostile installations.

Production work will be done at the Pomona operation of General Dynamics' Electro Dynamic Division.

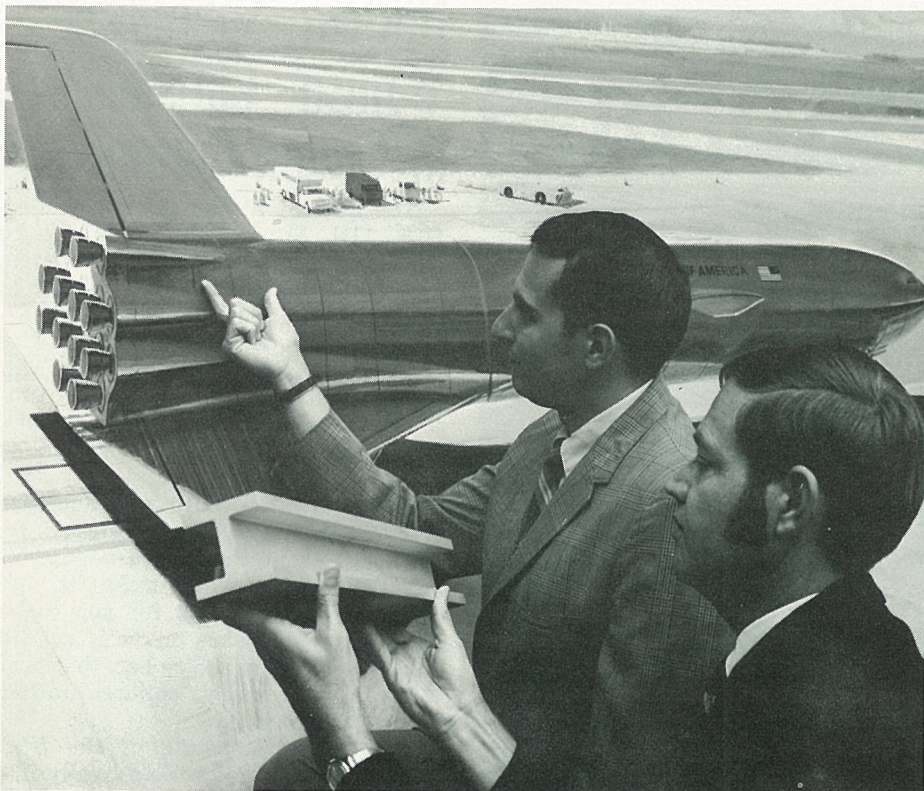
The improved system will provide increased tactical ability for the Navy missiles, but will not alter basic performance in areas of speed or range. The missile is also applicable for surface-to-surface use.

Standard ARM development was initiated in early 1967. Just one year later Standard ARM was deployed by the Navy and Air Force.

Continuous improvements in the Standard ARM system has been effected by General Dynamics to meet changing threats.



ON DELIVERY—Camouflaged F-111D with wings extended is shown in flight. First D models with Mark II avionics system are now being delivered.



SHUTTLE TASK—Convair Aerospace-SD is to design and fabricate Space Shuttle vehicle test subassemblies from boron-aluminum composite materials. Dr. M. F. Miller, left, points out on painting about where such parts could be used on shuttle booster as J. L. Christian holds I-beam that is nearly as thick as some of subassemblies to be fabricated from the material.

Structure Assemblies Of Boron-Aluminum Studied for Shuttle

Full-scale and full-thickness Space Shuttle vehicle thrust structure subassemblies will be designed and fabricated from boron-aluminum composite materials by Convair Aerospace Division's San Diego operation under a \$375,000 contract recently awarded by the NASA Marshall Space Flight Center.

The 15-month research and development task will include extensive boron-aluminum composite materials evaluation, design and analysis, process technology development, fabrication of small and large-scale test components, and test and evaluation programs to be conducted at the Convair Aerospace-SD Kearny Mesa plant and in NASA-Marshall laboratories in Huntsville, Ala.

Dr. Michael F. Miller, senior metallurgist who is managing the program for Convair Aerospace-SD's Process Research Dept. 572-2, and Jack L. Christian, staff scientist, said the program will be the first to demonstrate feasibility of using full-thickness boron-aluminum composite materials for the Space Shuttle and other aerospace vehicles that will be subjected to high loads and wide temperature ranges.

Boron-aluminum composite materials have been found to provide the "strength and stiffness of steel with the weight of aluminum." Christian said such composite metals offer 20 to 60 per cent weight savings over conventional materials in aerospace structural applications.

Largest test article to be delivered under the new contract will be more than 1/2-inch thick and six feet long by 15 inches wide. Technology developed for its production must be usable for fabrication of 10 by 30-foot components.

Convair Aerospace-SD has been a leader in development of boron-aluminum composites for seven years.

General Dynamics World

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Bill Levering—Editor

Jack Isabel—Associate Editor

Monster Data Buoy Slated for North Pacific Study Goes to Sea

A 40-foot diameter, 100-ton environmental data buoy, built by GD's electronic operation, was towed to sea Oct. 11 and moored off the coast of Southern California.

Destination of the buoy will be a point 20 miles west of Los Angeles where it will be moored in 11,400 ft. of water for one year.

The operation is being conducted by Scripps Institution of Oceanography as part of the North Pacific Study for the Office of Naval Research. It will be towed to its mooring by the Scripps oceanographic research ship *Agassiz*.

Mission of the General Dynamics buoy will be to acquire oceanographic and meteorological data in support of the North Pacific Study. Purpose of the study is to investigate portions of the Pacific Ocean which have unusual influence on weather patterns affecting the United States.

Meteorological data to be gathered will substantially help weather forecasters in making more accurate environmental predictions for Southern California.

Data acquired by the buoy will be telemetered to a mobile data station,

operated by General Dynamics, at La Jolla, Calif. Information received will be immediately processed and transmitted to scientists at Scripps and to the National Weather Service.

Sensors aboard the buoy will monitor air temperature and pressure, dewpoint, wind and water current velocity, solar radiation, precipitation, wave height and salinity and water temperature at various depths to 1,700 feet. Continuous power is provided by a propane-fueled engine.

Including this buoy, a total of four General Dynamics' ocean data stations are operational in the Atlantic and Pacific oceans. Six additional ocean data stations are currently under construction for the National Oceanic and Atmosphere Administration (NOAA). They are scheduled for deployment in the Gulf of Mexico early next year.

Ocean data stations have been under development by the Electronics operation of the Electro Dynamic Division, San Diego, since 1960.

'Batfish' . . .

(Continued from Page 1)

best—real shipbuilders and real leaders."

Paige then paid tribute to Pierce, who was marking his fourth anniversary as division general manager and his 20th year with General Dynamics.

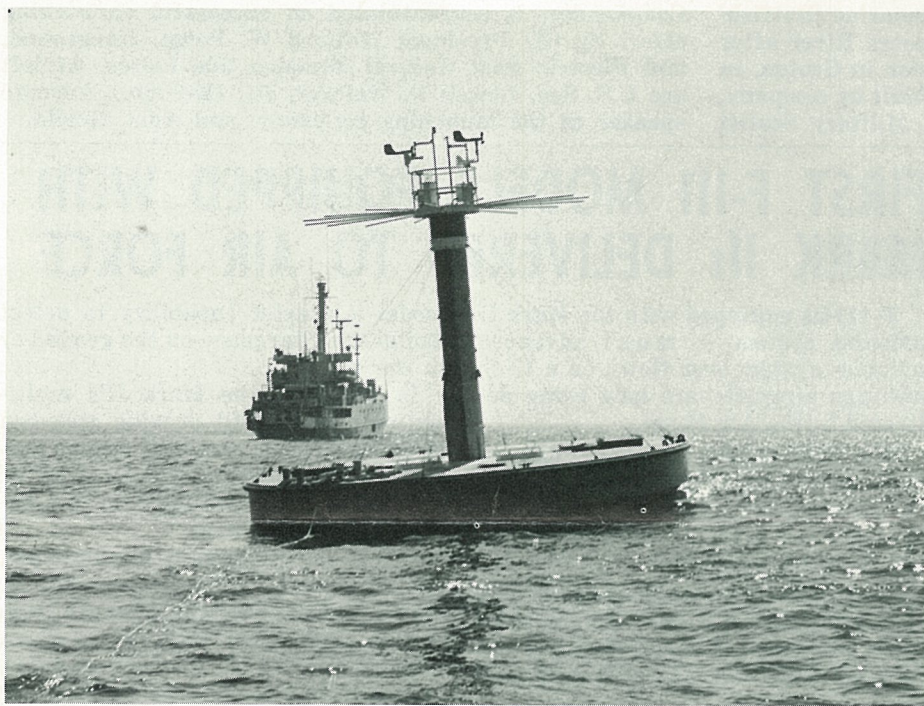
Other guests included Assistant Attorney General L. Patrick Gray III; Rear Adm. Richard E. Henning, Deputy Commander for Production, Naval Ship Systems Command; Rear Adm. Joe Williams, Jr., Director Attack Submarine Division for Deputy Chief of Naval Operations (Submarines); Rear Adm. Frank D. McMullen, Commander Submarine Flotilla Two, and Capt. Albert E. Rose, Jr., Supervisor of Shipbuilding, Conversion and Repair, Groton.

The prospective commanding officer of *Batfish*, Cdr. Richard E. Enkeboll, rode his ship down the ways. Cdr. Enkeboll, from Santa Monica, Calif., graduated from the Naval Academy in 1957.

Unseen by the spectators but vital to the operation was trigger man William Mark. Mark's function, on signal from launch coordinator Robert B. Chappell, Jr., was to "pull the trigger," a long, upright lever about midway down the ways which released the final link between the submarine and the fixed building ways, allowing the vessel to slide into the water.

Batfish, over 80 per cent complete at launching, is 300 feet long, with displacement of 4,200 tons, and will be manned by 12 officers and 95 men.

Batfish is the third new sub to be launched by Electric Boat in 1971, following *Archerfish* in January and *Silversides* in June.



WEATHERMAN—Electro Dynamic Division's 40-foot diameter, 100-ton weather buoy is towed into position for mooring in 11,400 feet of water in the Pacific 200 miles off Los Angeles. Buoy will be used in North Pacific study.

'FIRE AND FORGET' MISSILE SYSTEM DESIGNED FOR HELICOPTER LAUNCH

General Dynamics Pomona operation has unveiled its new "fire and forget" guided missile system designed to enable U. S. Army helicopters to knock out mobile ground threats while evading enemy fire.

The new missile system uses a modified version of the proven Redeye heat-seeking missile developed by the Electro Dynamic Division of General Dynamics.

The new system is called MRAM, short for Multi-mission Redeye Airlaunched Missile system. Two of the new version Redeyes would be carried in each of two reusable launch pods mounted on a helicopter. When launched, the "fire and forget" missile would guide itself to a mobile ground target while the helicopter whirled away in evasive maneuvers.

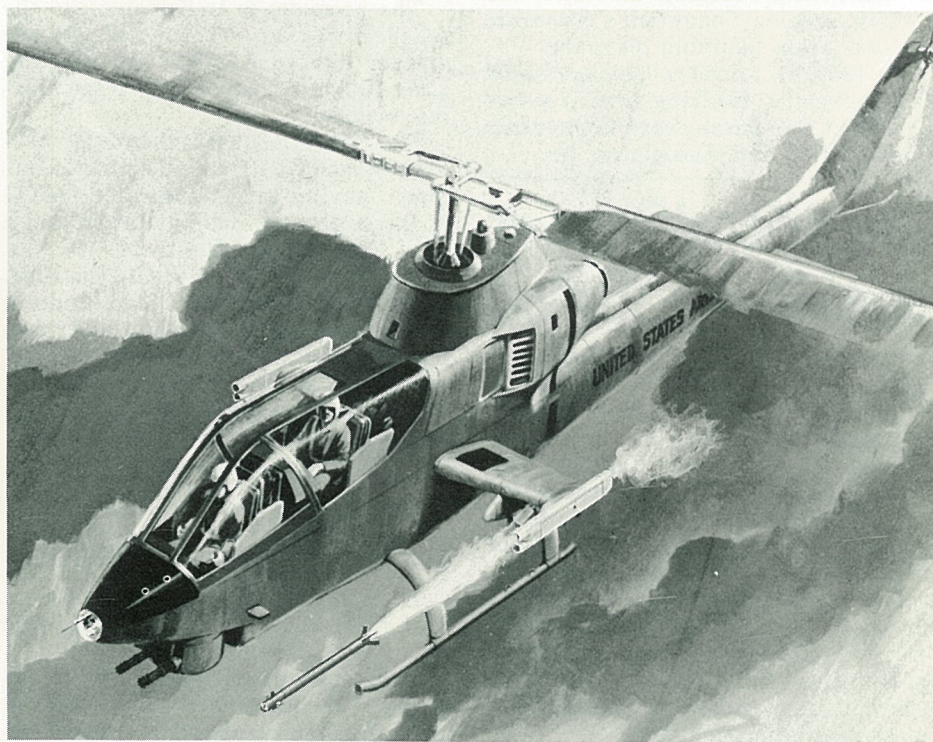
General Dynamics, which showed the new system at the annual meeting of the Association of the U. S. Army in Washington, D.C., said MRAM would greatly enhance the combat survivability of helicopters. The company has submitted a proposal for a feasibility demonstration of the system to the Army and MRAM is a candidate for a prototype program in 1973.

The system has been designed so that only minor modifications are required to helicopters.

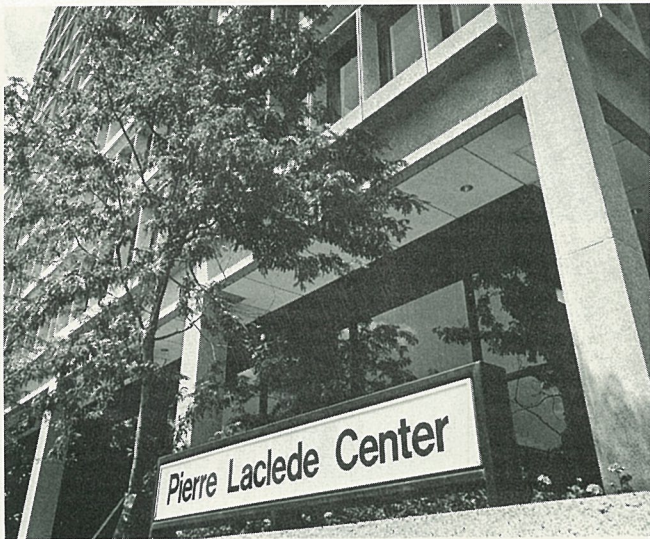
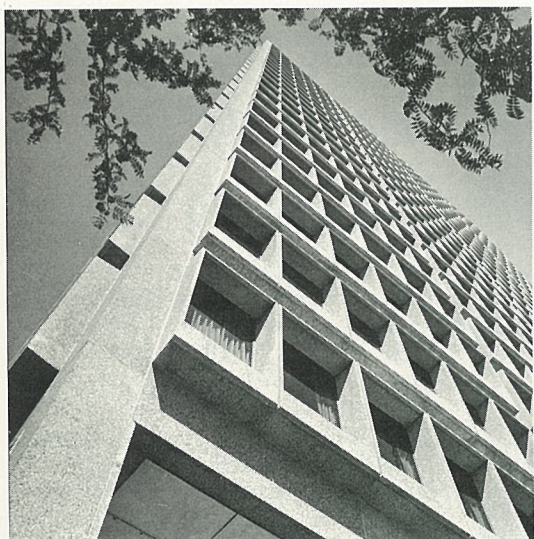
The MRAM system provides for target detection, threat evaluation and target destruction of ground vehicles. Although visual cockpit displays can be provided, the system can

be limited to existing target acquisition equipment and a missile fire button. The system does not affect the primary mission of the helicopter.

The basic Redeye missile is operational with the Army and Marine Corps for use as a one-man, shoulder-fired weapon.



'FIRE AND FORGET'—MRAM for Multi-mission Redeye Airlaunched Missile system was unveiled by General Dynamics at Association of U. S. Army conference recently. Designed for launch from helicopter, artist's concept shows reusable pods with two missiles.



HEADQUARTERS—Layout shows scenes at General Dynamics Headquarters in St. Louis. At upper right is Gail Mitchell, 15th floor receptionist. Lower left, Florence Vaccaro, Barbara Stuart and Joan Meinberg, execu-

tive secretaries. Lower center, Carol Hart, Tracy Brooks, Cathie Horrell, Dr. Fred Ritzinger, Elizabeth Ryan. Lower right, Sandra Kay, Mary Meade at switchboard of Stromberg-Carlson CROSSREED all-electronic phone system.

Material Service Starts Pouring Concrete for Chicago's Sears Tower

Material Service has begun deliveries of ready-mixed concrete for the new Sears Tower in Chicago, one of the largest orders MS has ever received. Concrete requirements for the structure (to be the world's tallest) will total approximately 111,000 cubic yards.

The concrete will be of two basic types—ordinary heavyweight (made with sand and gravel), and lightweight (made with Materialite, a lightweight expanded shale aggregate that MS manufactures at its plant at Ottawa, Ill.). The heavyweight concrete is used for the foundations and substructure of the building. The superstructure will use 65,000 cubic yards of Materialite concrete.

Materialite concrete, trademarked by Material Service, is marketed throughout a six-state Midwestern area, and has been used on virtually every new structure built in downtown Chicago since its introduction in 1958. Other consumers include manufacturers of concrete block, precast concrete and ready-mix cement.

One of Materialite's major advantages is that it is as strong as heavyweight concrete, but one-third lighter in weight.

Canadair's Surveillance Drone Tested

The AN/USD-501 Unmanned Airborne Surveillance Drone System (Canadair designation CL-89) has recently passed two major milestones. It was evaluated by the Italian Ministry of Defense during June trials in Sardinia at the Salto de Quirra Range, which is administered by the Italian government. A tripartite program among the Canadians, British and Germans, the system has also been used, and the drone flown by German troops for the first time at the Bergen-Hohne Range in Germany.

The Sardinia trials consisted of 12 flights conducted primarily by British troops, and were flown against requirements established by the Italian Ministry of Defense. The results demonstrated that the system met all stated requirements with ease.

From Sept. 1 through 17, trials were held at the Bergen-Hohne Range, under the scrutiny of the German Air Force Materiel Qualification Test Centre (MBL) which is responsible for the approval of all "flying objects" used by the armed forces.

The series of 15 flights, all of which were successful and on schedule, ably demonstrated the suitability of the system for use in a confined area. The Bergen-Hohne Range is small and is bounded by an autobahn on one side, a highway on another, and is also adjacent to an artillery

range. These flights showed that the CL-89 is dependable and that the navigation system is extremely accurate. Furthermore the command system, installed for training exercises and peace time use, is a reliable method by which the flight conductor may steer or recover the drone in any stage of flight if so required.

Toward the latter part of the flight program officials of the West Ger-

man government and armed forces witnessed the flights. A party of international military observers from the U.S. and other NATO countries witnessed the launch and the recovery in the same area. They were able to examine the undamaged drone and inspect the photographs generated as a result of the flight. The results of the flight program were termed excellent.

FRAME-USAGE LEASE PLAN PROGRAM PROVIDES FOR LOW START-UP COST

Stromberg DatagraphiX has announced a breakthrough in Computer-Output-Microfilm system lease pricing that may set a trend for the entire COM industry.

Called the Frame-Usage Lease Plan, it is designed for new users, enabling them to obtain a COM system at extremely low cost while starting up their applications and uses. For example, through the plan customers will be able to lease an entire on-line COM business system, complete with microfiche generating, processing and duplicating capabilities, for about the same price as the lowest-cost competitive on-line recorder alone.

All three DatagraphiX business

COM recorders—the 4440 (on- or off-line), the 4360 (off-line), and the 4200 (on-line)—are available under the Frame-Usage Lease Plan. The support elements of each system include such equipment as universal cameras, phase-encoded tape drives, and film processors, duplicators, cutters and viewers.

The plan calls for a standard minimum lease charge per month for each item of equipment included in the selected system. This minimum figure is based upon a standard per-page-charge with the same rate applied incrementally to any usage over the minimum.

'D' Models . . .

(Continued from Page 1)

Prototype testing of the Mark II system has been carried out in over 400 hours of flight-testing to date on F-111As 27 and 28.

The Air Force has begun climatic testing of a Mark II-equipped F-111 in the cold hangar at Eglin Air Force Base, Fla., where it is being subjected to sustained below-zero temperatures. "Live" cold tests will follow in Alaska this winter.

Next spring, the aircraft will be put through flight tests in the humid and rainy climate of Panama.

And finally, the "D" model will be flown to Edwards Air Force Base, Calif., to complete Category II testing.

A total of 96 F-111Ds will be delivered to the Air Force. These aircraft will join the 427th Tactical Fighter Wing at Cannon Air Force Base, N.M.



CANADAIR DRONE—West German and Italian governments recently evaluated Canadair's Unmanned Surveillance Drone designated AN/USD-501. In left photo



drone is triggered and shown being launched from armor carrier; right, close up and recovery of unmanned drone after parachute return to surface following mission.

Convair Aerospace-Electro Dynamic San Diego

San Diego Earns Third Craftsmanship Award

General George S. Brown, commander of the Air Force Systems Command, has advised Convair Aerospace Division's San Diego operation that it has met all requirements to receive the third Sustained Craftsmanship Performance Award under the Air Force Zero Defects Program for performance during the period May 1970 to April 1971.

"This award is in recognition of sustained superior performance through individual craftsmanship reflecting outstanding achievements, increased efficiency and economy," General Brown wrote M. C. Curtis, vice president and general manager of the San Diego operation.

"Please extend my personal congratulations to all of your participating employees."

W. E. Magnuson, chairman of the Convair Aerospace-SD Craftsmanship program, said arrangements will be made for formal presentation of the Sustained Craftsmanship Performance Award certificate and banner by a Defense Supply Agency representative.

Speakers Bureau Forming

Convair Management Association is forming a speakers bureau to fill requests for speakers on subjects ranging from technical and instructional topics to travel and humor.

Interested members may phone Harvey Seibert, ext. 2161 KM. A Toastmaster's speech-craft class may be scheduled for those wishing to polish up their skills before taking speaking engagements.

Idea to Convert Scrap Results in Big Saving

D. W. "Dutch" Schultz, a material program analyst in Convair Aerospace-SD's Dept. 860, has been awarded \$3,259.70 for an Employee Suggestion which will convert scrap material into a useful product.

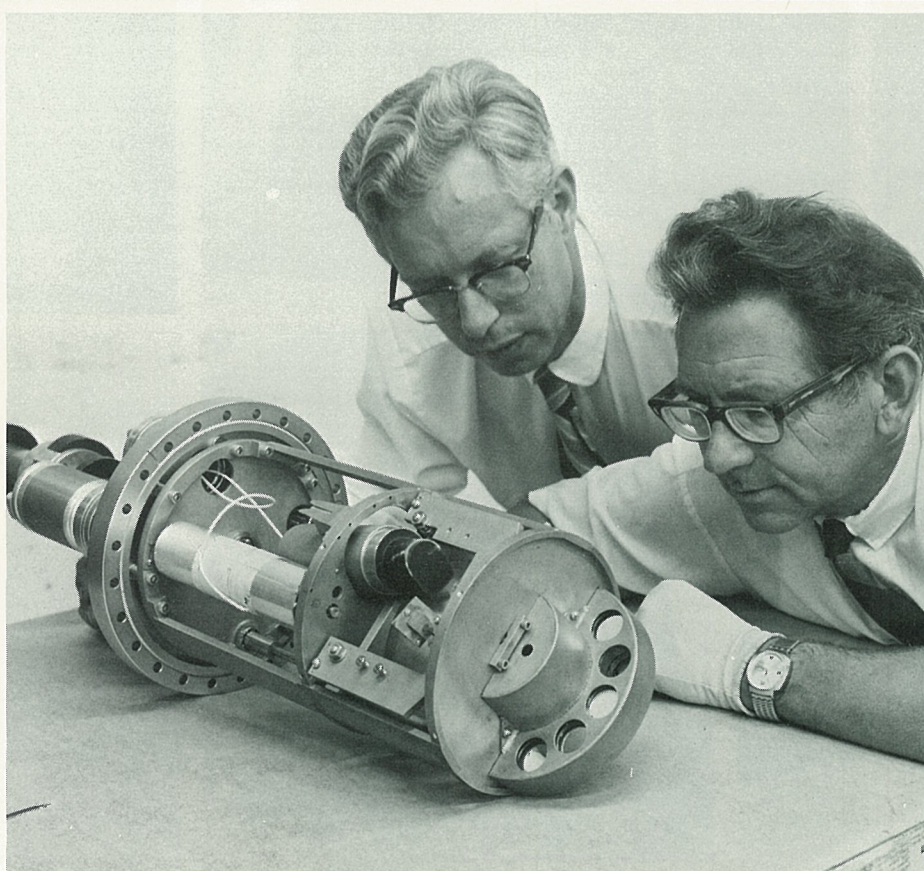
For a special program involving composite material, a mid-western company had been selected as source of supply for a particular fitting. Costs were prohibitive; yet local firms were unable to meet Convair's requirements.

Dutch said, "I took one look at the quoted prices and asked 'Why?' A holdover from earlier Value Engineering Classes."

Under his suggestion molds were constructed and scrap materials was melted and formed into blocks. As a result, fittings can now be machined locally from these blocks at a first year savings of more than \$32,000.



FIRST TIME OUT—D. W. "Dutch" Schultz, left, receives \$3,259.70 award check for first suggestion he's submitted from H. E. Moose, director of material. Idea will save \$32,000 during first year.



SENSOR SYSTEM—Dr. J. T. Neu, right, and Ed Wrench of Convair Aerospace Division check laboratory test instrument used to verify detection concepts to be incorporated in a sensor module being developed by NASA's Marshall Space Flight Center. The sensor module will be used to measure effects of contamination on spacecraft optical components.

Device Under Development for NASA Will Sense Optical Degradation Rate in Vacuum

A sensor module to measure degradation of optical components exposed to contamination in a vacuum atmosphere is being developed by Convair Aerospace Division under a \$160,000 contract from NASA Marshall Space Flight Center.

Dr. J. T. Neu, chief of sensor technology for the division's San Diego operation, said the engineering evaluation sensor module will be used initially in NASA's large vacuum chamber A at the Manned Spacecraft Center in Houston to measure optical degradation of spacecraft windows, lenses, and mirrors from contaminants which may be present within the chamber. It will be designed, fabricated, tested, and delivered in about nine months.

"Large oil-pumped vacuum chambers used for spacecraft testing, al-

though well baffled, may still allow deposition of a very thin oil film on exposed optical surfaces," Dr. Neu said.

"When exposed to actual or simulated solar ultraviolet radiation, a cracking or chemical reaction within the oil film produces a varnish-like substance which may seriously affect performance of the optical components by increasing scattering of light, decreasing the transmission from lenses or windows, and decreasing the reflectance from mirrors," he said.

"NASA wants to make sure that the environmental testing done in chamber A on the Apollo telescope mount and other similar spacecraft does not degrade their optical components before the vehicle is orbited."

Convair Aerospace-SD previously developed a laboratory test instrument for NASA-Marshall that has been used to prove feasibility of the detection system to be incorporated in the new sensor module.

F-111 Electronics Bay, Fixed-Cowl Ship Sets Orders Completed

Convair Aerospace-SD recently completed and shipped the last of 501 F-111 electronics bay and 341 fixed-cowl ship sets for the Fort Worth operation under the initial and follow-on F-111 support contract.

Clyde Medearis, general foreman of F-111 assembly Dept. 027 at Air Force Plant 19, said the last of the electronics bays was completed two weeks ahead of schedule. Jim DeHope was supervisor for the electronics bay and Ray Walling for fixed-cowl assembly operations.

Medearis said close-out of the initial and follow-on order of electronics bay and fixed-cowl ship sets resulted in an orderly transfer of 300 employees to DC-10 fabrication and assembly departments at Lindbergh Field during a period of several weeks.

"These men are highly skilled at assembly of these F-111 units and many will be returning to reactivate these production lines next year if an anticipated follow-on order is received," he said.



SENDOFF—Looking over shipping documents at Convair Aerospace-SD for last F-111 electronics bay (right background) and fixed-cowl (left background) under current contract, from left, are Obie Kennann, inspection supervisor; E. L. Kriewitz, Defense Contract Administration Services quality control specialist; Bill Hager, Fort Worth operation procurement quality assurance representative; and Clyde Medearis, Dept. 027 general foreman.

Management Assn. Honored As NMA 'Outstanding Club'

Convair Management Association has been awarded the National Management Association's "outstanding club" award for 1970-71 at the NMA annual convention in Beverly Hills.

M. C. Curtis, vice president and general manager of Convair Aerospace Division's San Diego operation, accepted the award for the 2,000-member association. Among association officers present for the awards ceremony were Herb Day, 1970-71 president, and Chuck Simmons, current president.

Convair Management Association garnered the top NMA award in the "large club" division based on points earned for management development programs, youth activities, community services, membership participation, and other activities.

Management Courses

During the 1970-71 year, the Convair association sponsored or co-sponsored 117 management development courses totaling 3,859 hours with 3,618 participants and 47 management development conferences totaling 243 hours with 672 participants. Also held were 1,062 special educational meetings on management subjects consisting primarily of recorded or filmed presentations.

The association sponsored and provided guidance for two Junior Achievement companies and a computer programming course for high school students and awarded seven \$500 scholarships to sons and daughters of Convair Aerospace-SD employees.

Enrichment Collections

Another highlight of the year was establishment of Management Enrichment Collections at the Kearny Mesa and Lindbergh Field plant libraries that now include 220 cassette recordings, 80 books, and subscriptions to 32 magazines and periodicals on management educational and motivational subjects.

This was the second consecutive year for Curtis to accept the top NMA "outstanding club" award. He received the 1969-70 award in behalf of the Convair Aerospace Fort Worth operation's Management Association and at that time prophetically remarked that he would "be back next year."

W. E. Magnuson, chief of special projects in reliability control for Convair Aerospace-SD, is NMA president and was presiding officer at the annual convention.

For information on General Dynamics World contact Convair Aerospace San Diego Public Affairs Dept., ext. 3322KM, or Electro Dynamic San Diego Public Affairs, ext. 3189KM.



TRACING TRANSITION—Closed-circuit TV and video enhancement system is used by Charles DeMund, left photo, as filmed radar target signatures are converted to digital computer data at Convair Aerospace-SD's Kearny



Mesa plant. In right photo, W. D. Johnson operates control console in data acquisition lab as T. M. Wooster and F. M. Urban look on. Work was done under contract from Naval Air Development Center.

Video Enhancement System—Data Facilities Linked to Convert Navy Radar Signatures

Capabilities of Convair Aerospace Division's video enhancement system and its environmental test laboratories' data acquisition facilities were linked recently for the Naval Air Development Command. The linkage will convert radar target signatures on 14,000 frames of motion picture film into computerized digital data.

Navy computer specialists will use the tape created in studies that are expected to aid radar operators in identifying types of targets from signatures being received.

"This proved to be a good, quick technique for converting signal tracings from film to digital data for future processing and analysis by computer," said F. M. Urban, a Dept.

578-5 test engineer who prepared the computer program for the conversion process.

Convair Aerospace Division's San Diego operation had received an \$8,100 contract from the Naval Air Development Center to convert the analog wave forms from 350 "runs" of 40 frames each of motion picture film to digital data on magnetic tape.

Image Projected

The image on each frame was projected onto a screen where it was picked up by a closed-circuit TV camera and displayed on monitors both before and after being channeled through the proprietary signal enhancement system developed in 1969 by Charles DeMund, a Dept. 516-0 photographic specialist.

The enhancement process was used to convert each signature to a solid white dot pattern on a solid black background with background "clutter" and film defects filtered out.

Each frame was slow-scanned electronically during a 4½-second period with 256 measurements, taken from a base line to the signature line, being transferred for processing in the core memory of a Varian 620 computer in the data acquisition lab.

As a quality check, a technician in the lab compared the signature on the last frame in each of the 350 "runs" before enhancement with a similar display created from measurement data fed to the computer tape. The contract required less than a two per cent variance between the two displays.

The project was completed in one week, only about one-third of the time originally expected, and was under the direction of T. M. Wooster, Dept. 574-2 data display group engineer.



LINKS LAURELS—Members of top two teams in Electro Dynamic-SD Management Club night golf tournament display awards. First place winners are, front row, Ed Lizarras, Claude Ganger, and C. B. Bagaloff of Team 10 in Sweet Swingers League. Second place winners are, back row, Jim Thelen, left, Ray Bergeron, and, not pictured, Jim Boelens of Team 6 in Toppers League. Many ED linksmen were active in night league.

Tour Information on Hawaii, Mexico Trips To Be Discussed

Convair Recreation Assn. will present details on special tours available for General Dynamics families to Hawaii, Mexico City, and Europe in a meeting at 7 p.m. tomorrow (Nov. 2) in Room C of the CRA Clubhouse.

The Hawaii tours will provide round-trip jet transportation from Los Angeles, eight days and seven nights at the Outrigger on Waikiki Beach, an aloha party, and a city tour—all for \$199 plus tax.

"This is the best Hawaii travel offer we've had available," said Del Dimmitt, CRA travel commissioner. "The whole package will cost less than usual round-trip air fare." Departures are scheduled Nov. 20 and weekly beginning Jan. 22. Two, three, and four-island tours can be arranged at a nominal additional fee.

Mexico City Trip

The Mexico City "package" will include round-trip air travel from San Diego and five days and four nights at the Hotel Reforma for \$159 plus tax. Departures are scheduled each Friday and Saturday. Return tickets are valid 21 days for those wishing to extend their stay.

Two-week "Continental Express-Europe" tours are scheduled periodically from West Coast cities and include a London theatre tour from \$455; London and Majorca from \$499; London, Paris, and Costa del Sol from \$499; London, Spain, Portugal, and North Africa from \$499; Middle East cities and London from \$737; London, Israel, and Athens from \$718; East Africa safari from \$885; and a Mediterranean cruise and four days in Israel from \$795.

Charger Tickets On Sale

Convair Recreation Assn. has a few choice-location tickets for San Diego Chargers football games. Phone ext. 1111 KM for details.

Six-Month NASA Study Contract Awarded to Convair-SD for Cryogenic-Fueled Vehicles

Convair Aerospace Division of General Dynamics has been awarded an \$94,800 NASA contract for a six-month study on the compatibility of carrying cryogenic-fueled launch vehicles such as the Centaur D-1T into space in the Space Shuttle orbiter cargo bay.

Such high-energy launch vehicles, after being deployed, would be fired in space to carry payloads into higher or interplanetary orbits.

The study is being funded by the NASA Lewis Research Center with Robert Lubick as project manager.

Carl Peters, design specialist who is study manager for Convair Aerospace Division's San Diego operation, said the study will define a baseline concept and delineate problem areas and proposed solutions associated with use of a cryogenic propulsion stage as an expendable third stage for the Space Shuttle.

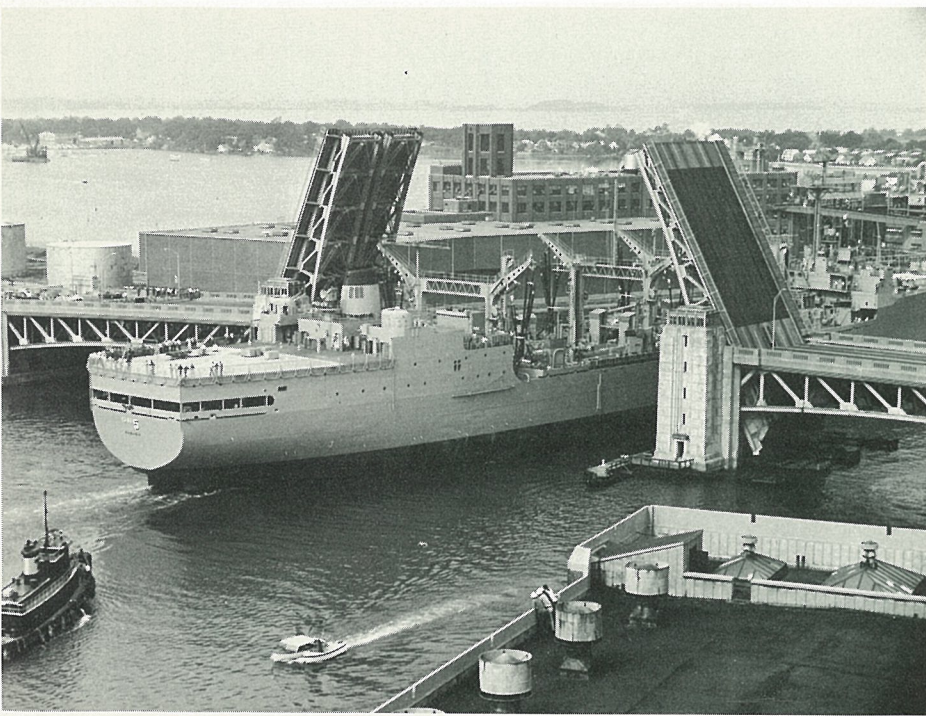
"The study will be based specifically on the Centaur D-1T and its support systems but the information generated may be applicable to any hydrogen-oxygen-fueled upper stage," he said.



DYNAMIC AID—In left photo, check for first half of \$8,000 pledge from Electronics operation Con-Trib-Club for 10 health agencies in Combined Health Agencies Drive (CHAD) is "signed" by Rudy Narvaez, left, and Gerald Lynn of Con-Trib committee. Accepting are Eldridge Hall, seated, who has learned to speak after laryngectomy



through Cancer Society-funded instruction, and G. Patrick Morse, CHAD president. Right photo, Bob Pullen, left, and Fred Maus, right, of Con-Trib-Club get acquainted with Mike Lutz, 6, and Mary Greer, 8, at Home of Guiding Hands after presenting \$5,000 check to Donald Chambliss, assistant administrator.



DELIVERED—'USS Wabash', fifth in series of fleet replenishment oilers being built for U. S. Navy by Quincy Shipbuilding Division, is shown passing through Quincy's Fore River Bridge. Members of Navy INSURV team had high praise for vessel's performance prior to delivery Oct. 21.

'Wabash' Delivered Following Navy Inspection Team Survey

USS Wabash (AOR-5), latest replenishment oiler built by Quincy Shipbuilding Division, was delivered to the Navy at Boston Naval Shipyard Oct. 21.

The 659-foot-long ship will be commissioned Nov. 20. After completion of final outfitting she will sail for her home port of Long Beach, Calif., and in January will begin service in the Navy's Pacific Fleet. Her prospective commanding officer is Capt. Robert P. Chrisler, a native of Auburn, N.Y.

Delivery was preceded by a highly

favorable report from the Navy Board of Inspection and Survey. The INSURV board members presented an official critique to key Quincy shipbuilders on Oct. 8, based on the board's observations during Wabash's official trials on Oct. 5 and 6.

Board members had praise for the Wabash areas that came under their inspection. "I'm almost speechless," said Capt. P. D. Kjelgaard, propulsion inspector. "This is one of the best ships I've inspected."

Kjelgaard, who is about to be reassigned from his inspection activities, added, "My relief has a standard by which to judge all ships. It is a pleasure to inspect at Quincy."

Capt. J. A. Cush, habitability inspector, said that "compartment closeouts were superior. The overall condition is outstanding, showing that the hard work really paid off."

In summary remarks, Quincy Shipbuilding Division's General Manager Lloyd Bergeson thanked the board for its efforts and expressed appreciation to Quincy shipbuilders for their dedicated work.

Capt. Robert Delgado, Quincy's Supervisor of Naval Shipbuilding, said, "I am pleased to note that each of the builder's ships coming on line is better than the last."

The 37,360 ton Wabash is the fifth replenishment oiler built at Quincy. Her crew numbers 371 officers and men. She was christened on Feb. 6, 1971, by Mrs. William C. Bray, wife of the Congressman from Indiana's Sixth District.

NEW 'TRAIL BLAZING' MAIL SYSTEM DEVELOPED BY ELECTRO DYNAMIC

An electronic "trail blazing" system has been developed by General Dynamics to mark the distribution path of letters, packages and large freight from origin to destination.

The system, called PROMPT for Program Recording Official Mail Point Time, was first developed with company funds to assist the U. S. Postal Service and was successfully tested during the past year in the San Diego and San Francisco, Calif., post offices.

A versatile system that can be used alone or with computers, PROMPT can be utilized to pinpoint the location of individual railroad cars, sea-land cargo containers, trucks and any other means of freight shipment as well as monitor the flow of mail.

Because the PROMPT system knows where an individual item is as it passes monitoring points, it can reduce freight pilferage during transit. PROMPT also can be used for security monitoring of stored merchandise and for internal inventory control.

Developed by General Dynamics' Electro Dynamic Division, PROMPT was demonstrated recently at the National Postal Forum to postal officials and shippers from across the country.

Heart of the "trail blazing" system is a printed circuit card which can be inserted in a letter, attached to the outside of or placed inside a shipment.

As the shipment passes PROMPT monitoring stations at key locations along the distribution route, the printed circuit card is activated by a

high-frequency signal. The card responds with a coded signal identifying itself.

The monitoring unit also is capable of transmitting such information to a central computer or "memory" bank along with the unit's location and time of passage. At any time during the distribution cycle, a user may query the memory bank and pinpoint the location of his shipment on a "real time" or actual basis.

Thus, adapting the electronic know-how acquired through various aerospace programs, the Electro Dynamic system can produce substantial savings for shippers in tracking down lost or mis-routed packages and freight. Its potential is being evaluated for additional Postal Service use and other applications.

Fellowship in AIAA Goes to Heinemann

Edward H. Heinemann, corporate vice president, has been elected an Honorary Fellow of the American Institute of Aeronautics and Astronautics.

Heinemann was one of three elected this year by colleagues to the highest membership rank in the AIAA. Astronaut Neil Armstrong and Russian Academician Andrei Nikolaevich Tupolev were the others.

Heinemann accepted the fellowship certificate during the AIAA President's Reception and Honors Banquet last week in Washington, D. C.

Up-rated OV-1 Spacecraft Displayed at AFA Show

Convair Aerospace Division, using mostly off-the-shelf hardware, has up-rated its veteran Orbiting Vehicle One spacecraft into an upper-stage vehicle that is seen as a contender for future Air Force, NASA, and commercial satellite space missions.

A full-scale mockup of the new vehicle—called Orbiting Vehicle One-B (or OV1-B)—was displayed publicly for the first time during the Air Force Association's 1971 national convention last month in Washington.

Convair Aerospace developed the regular OV1 in the mid-1960s as a reliable low-cost vehicle for a variety of Air Force missions. It has a string of 10 consecutive successes.

The new OV1-B has been designed primarily for use with Convair Aerospace's Atlas launch vehicles and Centaur high-energy upper-stage vehicles. It is, however, readily adaptable for use with other launch vehicles.

It has an overall height of 77 inches and a base diameter of 60 inches. Its weight at launch is 2,700 pounds.

With the Atlas Standard Launch Vehicle-3A, the OV1-B could place a 1,750-pound payload into a synchronous transfer orbit from Cape Kennedy. This is the type of orbit used to start communications satellites toward fixed-position orbits.

With the Atlas F, the retired Strategic Air Command intercontinental ballistic missile built by Convair Aerospace and refurbished as an Air Force launch vehicle, the OV1-B could place a 1,750-pound payload into a 700-nautical-mile circular polar orbit from Vandenberg AFB, Calif.

The OV1-B also could serve as a third stage atop the Titan-Centaur to send payloads to Jupiter.

'Forbes' Cover Story on General Dynamics

General Dynamics, its management and prospects for future business, is the subject of the cover story in the Oct. 15 issue of Forbes magazine.

The corporation's top management team is described as "unquestionably the best" in General Dynamics' history.

Forbes concluded that General Dynamics should not be thought of as a single company but rather as "a kind of conglomerate" and predicted that for 1971 "missiles and data products should edge into the black, and commercial aircraft—mainly subcontracting for McDonnell Douglas—will come closer to profitability."

"Submarines, resources (mainly Material Service Corp.) and telecommunications (Stromberg-Carlson) will remain solid money-makers." The magazine added that though the F-111 program is nearing completion, there could be some significant additional orders placed for F-111s during the years ahead. It is the only Air Force bomber currently in full-scale production and will be until North American Rockwell's B-1 bomber is delivered to the Air Force sometime in 1977.

GD Briefs Investors

St. Louis corporate headquarters hosted 21 representatives of institutional investor firms at a day-long briefing Sept. 23. The meeting included presentations by Chairman David S. Lewis and President H. W. Paige as well as presentations by division and subsidiary management on their major programs and product lines.

Presentations were made by Frank W. Davis, President, Convair Aerospace Division; Jack Bowers, President, Electro Dynamic Division; Lester Crown, President, Material Service Corp.; Frank Nugent, President, Freeman and United Electric Coal Co.; D. L. Bibby, President, Stromberg-Carlson Corp.; Donald Mitchell, Executive Vice-President, Stromberg-Datagraphix, Inc.; and J. D. Pierce, General Manager, Electric Boat Division.

Institutional investors manage funds that hold General Dynamics common stock in their portfolios, and are therefore interested in our current business volume and activities.

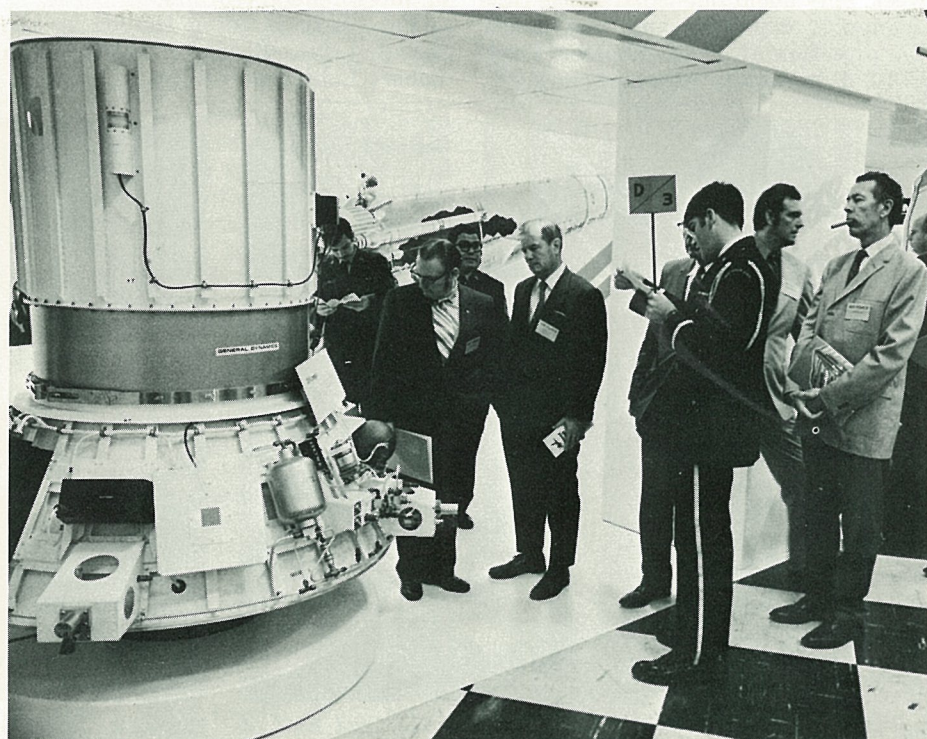
Investors attending represented firms in Chicago, New York, Boston, Hartford, Elizabeth, N.J., Denver, Minneapolis, and Kansas City, Mo.

Nominees Sought for Award by AIAA

The American Institute of Aeronautics and Astronautics has issued a call for nominees to be considered for the institute's Structures, Structural Dynamics and Materials Award.

A \$500 honorarium, sponsored by General Dynamics, and certificate of appreciation go along with the award presented for outstanding technical or scientific contributions in the aerospace structures field.

Nominations should be submitted to AIAA headquarters in New York City by Dec. 1. Award will be made next April at the AIAA Structures, Structural Dynamics and Materials Conference in San Antonio, Tex.



NEW UPPER STAGE—Visitors to General Dynamics exhibit at recent Air Force Assn. national convention in Washington, D.C., inspect mockup of new OV1-B spacecraft. Mounted on equipment module are attitude control, guidance and telemetry components for up-rated veteran upper stage vehicle.

General Dynamics World

Vol. 1, No. 7

GENERAL DYNAMICS CORPORATION — SAN DIEGO 4178

November 15, 1971

GD Reports Increase in Net Earnings for Third Quarter of '71

Net income of General Dynamics for the third quarter ending Sept. 30, 1971, was \$5,781,000, equivalent to \$0.55 per share of common stock on sales of \$477,898,000, David S. Lewis, Chairman, announced Nov. 3. This represents an increase over the \$4,037,000 or \$0.38 per common share for the third quarter of 1970 on sales of \$532,258,000.

In commenting on results, Lewis said, "Although sales for the quarter were 10 per cent less than for the same period in 1970, earnings per share increased more than 44 per cent. This earnings increase reflects the continuing efforts of all of our people to reduce costs and increase efficiency."

Nine-Month Figures

Net earnings for the nine months ended Sept. 30, 1971, were \$14,333,000 on sales of \$1,426,673,000 or \$1.36 per common share.

Lewis said, "While earnings for the first nine months of this year are below the amounts reported for the first nine months of 1970, it should be borne in mind that at the end of last year we were faced with the existence of sizeable cost overruns and a requirement to reduce earnings accrual rates retroactively. These adjustments resulted in an overall loss for the entire year 1970."

He added, "At this time, we believe that we are recognizing the realistic costs to complete our major programs and do not expect that it will be necessary to make year-end adjustments that would negatively impact our reported earnings. Therefore, we continue to believe that 1971 will be a profitable year."

George Durr Named Director-Australasia

George H. Durr has joined the International staff as Director-Australasia, John T. Hayward, Vice President-International has announced.

In making the announcement, Hayward said Durr will manage the Canberra office which serves Australia and Southeast Asia. He replaces Jack Phelan who will be reassigned in International operations.

Durr joined General Dynamics in 1965 with Stromberg Datagraphix Inc. and was manager display systems before transferring to International.

Convair-Launched Mariner 9 Eyes Mars After 280-Million-Mile Space Voyage

NASA's Mariner 9 was scheduled to go into orbit around Mars last weekend after a 5½-month and 280-million-mile voyage through space.

Convair Aerospace Division's Atlas-Centaur 23 launched the 2,270-pound spacecraft May 30 from the Eastern Test Range with such precision that less than a three-mile-an-hour correction was needed due to launch vehicle injection error in the trajectory correction maneuver on June 4.

During the next 90 days the modern Mariner is scheduled to map about 70 per cent of Mars' surface features as it orbits the "red planet" twice a day.

TV coverage from Mariner is expected to give scientists a better un-

Air Force Initiates Procurement For Twelve Additional F-111F Models



OFF TO IDAHO—Another F-111F leaves Fort Worth for the 347th Tactical Fighter Wing at Mountain Home AFB, Idaho. Fort Worth has been given go-ahead to purchase long lead-time items to build 12 more "F" models.

ORANGES PROVE HOT SALES ITEM; 'BUSHELS' SOLD TO INDEPENDENTS

Oranges have blossomed into a hot sales item for Stromberg-Carlson. "Bushels" of the General Dynamics subsidiary's orange telephones have been consumed by independent telephone companies across the nation.

Tom Worthy, vice president - marketing/customer service, reported that more than 25,000 orange telephones were sold in the first six months on the market. "We expected the color to be popular," he said, "but we were a bit overwhelmed by the initial demand for this totally new color."

First New Color

Orange is the first new telephone color to be offered by a U.S. telephone manufacturer since the 1950s. The warm reception of the contemporary color, Worthy said, "is an indication that the telephone is not ignored by telephone company subscribers."

The orange telephone has been something of a public relations tool for many telephone companies, Worthy said. "It has won the good will of subscribers who have been very enthusiastic about the color and the

telephone company that installed it."

The companies that have made the color available, Worthy said, "have shown that they are responsive to the wants of their customers." He noted that a great deal of potential for sales of the new color exists nationwide. The companies currently offering the color operate only a fraction of the more than 120 million telephones in the U.S.

Stromberg-Carlson is now making its full line of residential and business telephones including the Vista-phone picture telephone in the new color.

Fort Worth operation has received an \$8.5 million contract change notice which authorizes purchase of long lead-time items for 12 additional F-111F aircraft. Total price of the new contract is expected to be about \$112 million.

Purchase of the 12 additional "F" models will keep the F-111 assembly line open through 1973. Under the present contract, F-111 production would have ended in June 1972.

"We are very pleased that the Air Force recognized the need to continue production of the nation's only modern strike fighter," said R. E. Adams, Fort Worth operation vice president and general manager.

Delivery of F-111s—mainly D and F models—will continue at a rate of about 10 aircraft a month through February 1973.

The additional 12 F-111F aircraft now being ordered will be delivered at roughly a one-a-month rate between February and December of 1973.

The additional purchase will bring the total number of "F" models on order to 82—and the overall F-111 production to 538 aircraft.

The "F" model is equipped with new and more powerful TF 30-P-100 engines, which provide up to 35 per cent more thrust. Other improvements include a stronger wing carry-through structure, an improved attack-radar and a fully digital avionics system.

HOLIDAY OBSERVANCE

Most divisions and subsidiaries of General Dynamics will observe a four-day holiday over the Thanksgiving period.

Except for those specifically assigned to work, employees will be off from Thursday, Nov. 25 through Sunday, the 28th. Normal work schedules will resume on Monday, Nov. 29.



CALLED FOR COLOR—"Bushels" of orange telephones have been sold by Stromberg-Carlson since new color was introduced. In first six months on the market, more than 25,000 of the contemporary color telephones have been sold.

Additional CIWS Funding

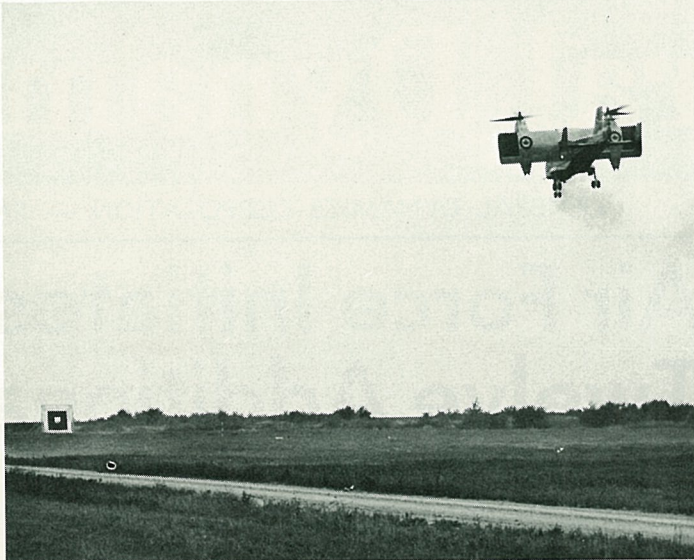
The Naval Ordnance Systems Command has approved funding of \$5,504,000 to Pomona operation of Electro Dynamic Division for continued engineering development of the Close-in Weapon System (CIWS).

Impressive results have been achieved in recent development tests of the shipboard system for close-in air defense.

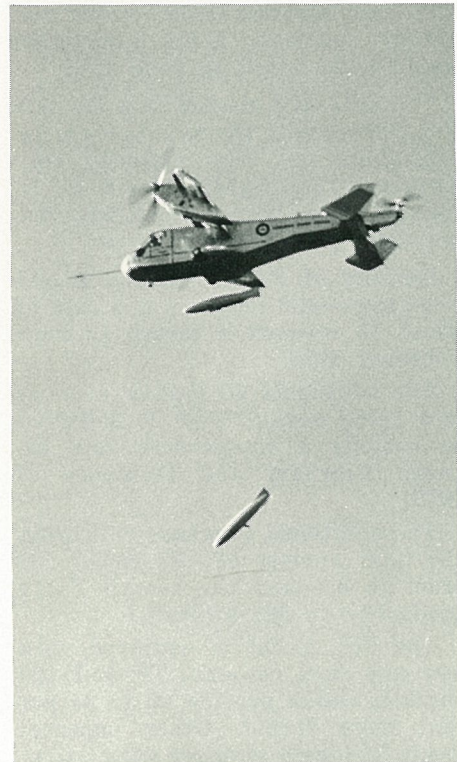
(Continued on Page 2, Col. 4)



FIRING TESTS—Canadair's tilt-wing CL-84-1 was demonstrated recently at Proof Engineering and Test Establishment (PETE), Nicolet, Quebec. Left, CL-84-1 takes off from Nicolet VTOL pad for gun firing sortie. In right



photo, aircraft pours steady stream of bullets through target from pod mounted 7.62 mm minigun while in stationary hover. Craft proved to be steady gun platform in all configurations during firing tests.



BIG DROP—Two 120 gallon drop tanks are released from CL-84-1 with wing at 40 degrees. Tests were carried out at Cartierville Airport.

Quincy Named Winner Of James Cogswell Security Award Honor

Quincy Shipbuilding Division has been named a winner of the James S. Cogswell Outstanding Industrial Security Achievement Award for 1971. The honor is given by the Defense Supply Agency of the U.S. Department of Defense for superior performance in carrying out security obligations on classified defense contracts.

Representatives of the Boston Defense Contract Administration Services Region (DCASR) presented the award to Quincy officials on November 2.

The division was one of only 40 winners this year from among the more than 13,000 industrial firms having Defense Department security clearances to perform on classified contracts. It is believed to be the first time that a shipyard has won Cogswell recognition since the award was established in 1966.

Factors in picking the winners included: degree of security consciousness evidenced by management personnel; security education and motivation programs for employees; regular inspections of security practices within the organization; security review procedures in company publications and advertising; adoption of new security methods in such areas as reproduction and transmission of documents, control of movement of employees, and visitors within plants.

The award is named in honor of the late Colonel James S. Cogswell, USAF, first Chief of the centralized Office of Industrial Security when it was established in 1965.

Canadair's CL-84-1 Scores High In Gun Firing, Drop Test Trials

The Canadair CL-84-1 tilt-wing V/STOL evaluation aircraft recently reached a dramatic stage in its flight test program with the demonstration of stores dropping and gun firing capabilities.

The drop tests were carried out at Canadair using two 120-gallon drop tanks mounted beneath the fuselage. Drops were made in various wing configurations and at various speeds, both with the undercarriage up and down. In every case, separation was clean.

Held at PETE

The firing trials, using a 7.62 mm minigun pod, were held at the Proof Engineering and Test Establishment (PETE) of the Canadian Dept. of National Defense range at Nicolet on the St. Lawrence River, about 100 miles east of Montreal. The aircraft remained in the open during the week's test program, operating from a 70-foot diameter pad.

Since the tests were conducted to assess gun firing effects on flight characteristics and not to obtain high target scores, the simplest form of reflector sight was used. Nevertheless, a high degree of accuracy was recorded in three configurations:

1—At 40 knots with the wing at 40-degree tilt (STOL mode) the score was 84 per cent of possible hits on target

2—At hover, with wings at 90 degrees, hits were 71 per cent

3—At 200 knots, with wing down and locked, the score was 30 per cent.

In the conventional configuration the first target was engaged at a range of 1,000 ft. with the CL-84-1 flying at 200 knots in a shallow dive. Later, in the same configuration, two passes were made on second and third targets with the aircraft weaving to assess the steadiness of the splash pattern as it snaked between the targets.

This maneuver was repeated at 110 knots with the wing at 15° and 45 knots with the wing at 40°. In all configurations the water splash pattern was steady, reflecting only pilot control movements.

Over land the aircraft was hovered 1,000 ft. from the target and, in the first sortie, the fire was held steadily on the target during each burst. In the second, fire was initially aimed off to the right then swung rapidly on to the target by yawing the aircraft.

The final hover sortie was probably the most significant, the results suggesting that adequate suppressive fire during hover rescues could be provided without the need of a turret.

The CL-84-1 was first aimed at one target and was rapidly yawed to the other. Then, while maintaining station, the nose was depressed and the fire was swept back impacting the ground short of the target line. The nose was further depressed and the fire swept once again with an impact line roughly 400 ft. in front of the aircraft.

Advantage

It is this ability to select and hold a fuselage angle while remaining stationary in hover that gives the CL-84-1 advantage over the helicopter, which is committed to move fore or aft when the nose is depressed or raised. Finally, the aircraft was aimed at a point between the targets and by lowering and raising the nose, fire was raked back and forth between 500 and 1,000 ft. range.

The CL-84-1 proved to be a remarkably steady gun platform in all configurations. Comments of the crew to this effect were confirmed by a cockpit-mounted movie camera looking over the pilot's shoulder.



SECURED—Quincy Shipbuilding has been named 1971 winner of Cogswell Award for excellence of its security program. Capt. M. N. Harris, USN, Boston DCASR Commander, presented citation to Asst. Gen. Mgr. H. T. Verano.

POST Seeker Tests Demonstrates Target Tracking Capabilities

A radically new concept in missile seeker design was evaluated in recent field tests of POST (passive optical seeker technique) hardware conducted at Twentynine Palms Marine Base in California.

The tests demonstrated feasibility of the POST principle and ability of the seekers to acquire and track military aircraft targets in severe background conditions.

The POST seeker is a General Dynamics-conceived passive optical sensor designed for use in missile weapon systems of the future. Features include increased sensitivity for early acquisition of targets, and optimum performance in a severe environment of background and countermeasures.

General Dynamics was one of three companies awarded contracts by U.S. Army Missile Command Research and Engineering Laboratories in 1967 to perform preliminary design studies of a new seeker concept that would satisfy requirements for next generation of MANPADS (man-portable) and LOFAADS (low-altitude) air defense weapon systems.

The POST design developed at Pomona operation of Electro Dynamic Division was selected in 1969 over competition for further development. A two-year contract totaling almost \$4 million called for extensive design and analysis efforts leading to the development and testing of the single and dual-channel POST seekers.

The recent field tests at Twentynine Palms climaxed efforts under the two-year contract and demonstrated ability of the POST seeker hardware to track tactical military aircraft flying a wide variety of courses against backgrounds of sky, mountains and horizon.

Mariner . . .

(Continued from Page 1)

violet spectroscopy to determine atmospheric constituents and pressure, infrared spectroscopy to measure radiation from the surface and atmosphere, infrared radiometry to measure temperatures of the soil, S-band occultation to study the planet's shape and atmospheric property variations, and celestial mechanics to aid in determining the size, shape, distance, and position of Mars.

Mariner 9, as the first Mars orbiter spacecraft, was to become, in effect, a small Martian moon along with its two natural satellites—Phobos and Deimos.

The Mariner '71 spacecraft's orbit was planned to bring it to within about 800 miles of the Mars surface. Closest previous approach was the Mariner 7 fly-by about 2,000 miles from the planet in 1969.

Engineering Services Contract to Pomona

Pomona operation of Electro Dynamic Division has received a \$3,254,000 contract modification increasing the level of effort of engineering services in support of the Navy integrated logistic support program for Tartar, Terrier and Standard Missiles weapon systems.

The Naval Ordnance Systems Command is the contracting activity.

General Dynamics World

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Bill Levering—Editor

Jack Isabel—Associate Editor

New Cutter Designed For Milling Titanium Spars at High Speeds

A new cutter for use in milling of titanium spars at up to 180 inches per minute has been developed by Convair Aerospace Division's San Diego operation. Previous standard cutting speeds have been 2 to 10 inches per minute.

Norm Fredrick, a manufacturing development engineer, said the rugged new cutter has been developed with company funds specifically for use in cutting of titanium spars for future hypersonic aircraft and space vehicles that are expected to be fabricated primarily from titanium.

Cost Reducer

"Tests indicate use of the new cutter at about 70 inches per minute will be the most economical," Fredrick said. "This will reduce titanium spar milling cost to about the same as that for milling of aluminum."

The new cutter is used on a numerically controlled milling machine. Its design is considered proprietary information.

C. E. Royce, supervisor of manufacturing development, said Convair Aerospace expects to be milling large quantities of titanium as future space transportation system vehicles are designed and fabricated.

Conrad Snyder and John Coulson, both manufacturing development engineers, also had key roles in the design, development, and testing of the new cutter.



EXACTING—Pomona operation has activated new microwave facility to manufacture high frequency missile components. Left, rigid disciplines and skillful hands are required as Dorothy Valdepena trims leads on high frequency component; center, Theresa Tramontano loads



modules—one of many exacting operations associated with production of high frequency components; right, Beverly Sullivan welds component at carefully designed work station. New microwave facility can support total of 175 assembly and test personnel.



Microwave Facility Activated at Pomona

A new microwave assembly and test facility has been activated at Electro Dynamic Division's Pomona operation to manufacture the exacting high frequency components required by increasingly complicated missiles.

"As the missiles produced at Pomona have become more sophisticated and more capable, we have advanced the state of manufacturing art in such areas as precision multi-layer boards, stripline boards, flexible harnesses and microwave assemblies," D. L. Perkins, manager of Standard Mis-

sile and Standard ARM manufacturing, said.

"The manufacture of high frequency or microwave components has been a gradual evolution requiring rigid disciplines in each operation," Perkins explained. "Our new microwave facility containing modernized assembly and test areas was necessary in order to maintain the more exacting disciplines."

The new microwave facility can support a total of 175 assembly and test personnel. Partial operation began last month.

Creating an efficient work environment are light colored walls, floors and ceilings with diffused lighting. Both temperature and humidity are controlled in the new facility.

Light-colored modular work benches allow for individual work arrangements at each station. These work plans were designed by manufacturing engineering for maximum efficiency in arrangement of tools and materials resulting in improved overall performance.

LNG May Be Answer to Future Power Shortages

The United States has never known a peace-time fuel shortage. But authorities predict that unless trends are reversed, the country will be faced with shortages of common forms of energy—oil, gas, coal and electricity and by 1985 will have to double the energy supply in order to keep up with demand.

Energy and a high standard of living go together. The U.S. has 6 per cent of the world's population, and yet consumes over 30 per cent of the world's energy. Demand grows at rates of 5 to 6 per cent per year. The U.S. is accustomed to an unlimited supply of energy at reasonable prices. But the recent power brown-outs in major cities, potential fuel shortages last winter on the East Coast, and the rising importance of pollution abatement have highlighted problems as never before.

Oil is the most flexible energy source available. It has been called upon to take up the slack and has responded well. But total oil production in this country is peaking and by the middle of the 1970s will be even dropping slightly. Today the U.S. im-

ports about 25 per cent of its oil from abroad, and by 1985 it is predicted this will rise to 50 or 60 per cent.

Extraction of oil from shale is possible, though so far it is only a marginal product from an economic standpoint. Potential synthetic supplies from coal are a better bet, but lead time before they are commercially available is 10 to 12 years.

And then there is gas. Reserves in this country have dropped 5 per cent since 1967. Even with a more vigorous program of exploration only an increase of 1 per cent a year can be seen between now and 1985.

But there are vast quantities present elsewhere. About 37 per cent of the world's proven gas reserves are in Algeria, Libya, Venezuela, Western Canada and the North Slope of Alaska. While gas can be transported through pipelines from the northern areas of the continent, the biggest sources are separated from the U.S. by oceans. Until a few years ago, transportation of gas by ship was viewed as a curiosity, but in 1959 a cargo of LNG was exported from Lake Charles, La. to Canvey Island at

the mouth of London's River Thames and inter-continental gas trading was born.

Since 1964, three specialized carriers have been carrying LNG from Algeria to England and France. Already 12 ships are operating and some 25 more building or under contract. It has been forecast that by 1980 the world traffic, and an appreciable percentage of it could be to the United States, will require between 70 and 80 ships with the size increasing as technology progresses.

All of the ships have been built in foreign yards so far. Can these yards provide the deliveries the world market will require? Probably not, and therein lies the opportunity for Quincy Shipbuilding Division's proposed new 120,000 cubic meter LNG ship.

(Final installment in this series will appear in a forthcoming issue.)

SAMSO Commander Wins Langley Medal

Lt. Gen. Sam C. Phillips, commander of the Air Force Space and Missile Systems Organization (SAMSO), has been awarded the Langley Medal by Smithsonian Institution for contributions he made while director of NASA's Apollo manned space flight program from 1964 to 1969.

The Langley Medal has been awarded only 13 times during the past 60 years. First recipients were Wilbur and Orville Wright in 1909. Others have included Charles A. Lindbergh, 1927; Richard E. Byrd, 1929; Robert H. Goddard (posthumously), 1960; Alan B. Shepard, Jr., 1964; and Dr. Wernher von Braun, 1967.

As procurement agency for Atlas and Centaur launch vehicles for the Air Force and NASA, SAMSO is a major customer organization for Convair Aerospace San Diego operation.

DatagraphiX Microsearch System Provides New Sophisticated Service for Customers

A sophisticated, real-time management information system—the DMS Microsearch System—has been introduced by Stromberg DatagraphiX of General Dynamics.

The DMS Microsearch System combines all the advantages of an interactive on-line system with an inexpensive, readily-viewed microfilm system. With DMS, an unlimited amount of data is stored on microfilm and packaged in easy-to-manage cassettes. Only the index and current updating information on the data are stored in the computer, which provides real-time access to both chronologically and randomly stored information.

The DMS has a wide range of applications, some of which are credit history checking, personnel/job location, invoice retrieval, technical library document retrieval and computer-aided instruction. In addition to making paper filing systems obsolete, DMS replaces conventional on-line systems, which have proved unwieldy because of the vast amount of data required in the master data base.

Little training is required to operate the DMS. As new documents are received and placed on microfilm, indexing information is entered into the computer via the typewriter-like keyboard on the terminal. The index can consist of any number of parameters or search keys, such as name, date, key words or identifying numbers.

Document retrieval is quick and simple. When a search key is typed in, the computer responds by identifying the appropriate cassette and page numbers of film in the cassette. When the proper cassette is loaded into the DMS terminal, the film is automatically advanced to the correct page. Simultaneously, the DMS strip printer types out any updating information previously stored in the computer covering that document. The displayed data can be updated at any time simply by typing in the required change and pressing the UPDATE key.

DatagraphiX, a pioneer and leader in the Computer-Output-Microfilm field, has produced over half the COM business systems in use around the world today.



RETRIEVAL—DatagraphiX Industrial Relations Director Bill Teague retrieves microfilmed personnel document with DMS Microsearch System. Among other DMS applications are credit history checking, invoice retrieval, technical library document retrieval and computer-aided instruction.

Convair Aerospace · Electro Dynamic San Diego



METAL MASSAGING—Bill Timm, right, an industrial engineer, shows plastic media used to deburr DC-10 parts like that held by Dave Markovich, senior equipment engineer. Operating system are roto finishers Raul F. Perez, Jr., at left, and Arthur J. Sousa, in background.

Plastic Media Used for Deburring DC-10 Parts in Vibratory Machines

Burrs and rough edges on DC-10 sheet metal parts are being massaged away to perfection by thousands of small pieces of plastic "media" and vibratory machines in a new \$100,000 vibratory deburring system in Bldg. 1 at Convair Aerospace Division's Lindbergh Field plant.

Bill Timm, Dept. 202 industrial engineer, and Dave Markovich, Dept. 250 senior equipment engineer, said the new system is expected to save the San Diego operation more than \$250,000 per year and turn out cleaner, better quality, and easier to inspect parts.

Components

The new system is operated by Dept. 001 personnel under Hank Mohr, general foreman. Included are two large and two small vibratory machines, a four-compartment rotary hopper for media storage, a conveyor system, two vibrating screeners, a barrel dryer, soap and water spray and waste removal equipment and a hot water rinse tank.

Plastic media and parts are loaded into the vibratory machines which, after they are turned on, impart a rotary movement to the media and parts for the cutting action.

Small parts and media are unloaded through end discharge doors of the vibratory machines onto a vibrating screen. The media vibrates through the screen, leaving the parts

for pickup, and is returned to the hopper through a bucket-type conveyor elevator.

Timm and Markovich, who were instrumental in evaluation, acquisition, and implementation of the system, said all four vibratory machines can be operated simultaneously.

Scientific Study Shows

Electric Fish Have More Efficient Electronics

Dr. Eugene Agalides, a Romanian-born scientist in Convair Aerospace Division's life sciences department in San Diego, is making a detailed study of two species of electric fish in an effort to learn how more efficient communication, detection, and power systems may be developed for commercial or military use.

"Natural communication systems are much more efficient than our present man-made ones," Dr. Agalides commented. "Electric fish can sense very small variations in magnetic or electric fields, have a virtual jam-proof low-frequency type of detection system, and produce more power per gram of weight than any battery man has been able to devise."

Before joining Convair Aerospace this year, Dr. Agalides had been ex-

perimenting with electric fish for 13 years along with other duties while with General Dynamics divisions in Rochester, N.Y., and Pomona, Calif. One of his reports classifies 136 different species of electric fish by genus, subgenus, genera, type, and area of distribution.

Still needed is a determination of exact relationships between the transmitting and reception systems of electric fish and application of such knowledge to man-made systems.

Being used in the current experiments are *Sternarchus albifrons*, blind South America fish with a multiple electric organ that gives off a three-phase type of relatively weak electric signal, and *Malapterurus electricus*, a small electric catfish usually found in African river waters that gives off

approximately 350-volt discharges. The eyeless and solid black *Sternarchus albifrons* is propelled by a single fin to swim at any angle and can detect movement of other fish at distances to about half a mile. It points its dart-like tail at an intruder, which produces a discontinuity in the electric field produced by itself, then turns 180 degrees and uses its unique "radar system" to determine its action. Exactly how it produces its "flash of energy" is still under study.

Electric signals from one have been tape-recorded by Dr. Agalides and Howard Teel, an electronics technician serving as his laboratory assistant, and played back through electrodes in the tank of another fish of the same species. The fish in the second tank will leave the air inlet where it usually stays to approach the signal source as it "gets the message" from the other fish.

The *Malapterurus electricus* (electric catfish) once was confronted with a bass three times its size. The bass, with its mouth open wide for a hearty meal, was paralyzed with an electric shock from the catfish—which emits its electric discharge from a head-on position. An autopsy showed death of the bass was from a blood clot on the brain. "You might say the bass was scared to death by the *Malapterurus electricus*," Dr. Agalides said.

Dr. Agalides previously has experimented with the South American electric eel (*Electrophorus electricus*), the most powerful fresh-water electric fish which has killed men, horses, alligators, and jaguars with pulses exceeding 700 volts. A 50-volt discharge could be fatal to man.

Dr. Agalides was named a fellow of the Society for Advanced Medical Systems at its annual meeting Oct. 4-6 in Memphis, Tenn., where he also served on a three-day colloquia on criteria and standards for periodic health evaluation.

Dr. Agalides has been appointed space shuttle program director at Convair Aerospace Division, President Frank W. Davis has announced.

Convair Aerospace is concentrating on the booster portion of the two-vehicle space shuttle transportation system.

Rogers has been space shuttle program chief engineer at the San Diego operation since last December. He joined Convair Aerospace in 1949 and has served on a number of advanced programs at both the Fort Worth and San Diego operations of the division.

Rogers holds a degree in aeronautical engineering from Purdue University.

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Air Force Officers at San Diego Operation For EWI Assignment

Two Air Force officers — Maj. Gary A. Leach and Capt. James H. Maurice — are on a 10-month assignment with Convair Aerospace Division's San Diego operation in an Education With Industry Program sponsored by the Air Force Institute of Technology.

The two officers are undergoing a series of briefings to acquaint them with procedures in contracts, finance, engineering, material, industrial engineering, operations, reliability control, launch vehicle programs, and legal departments. Each will have a specific work assignment with one of the departments beginning in January.

Maj. Leach has been in the Air Force since 1958 and came to Convair Aerospace after serving as an RB-57F navigator at Kirtland, N. Mex., and a B-57 navigator at Phan Rang AB, Vietnam. He formerly had been an instructor-navigator at Hamilton AFB, Calif., and had a four-year assignment as a B-57 navigator at Yokota AB, Japan. He has a degree in business and economics from the University of Nebraska.

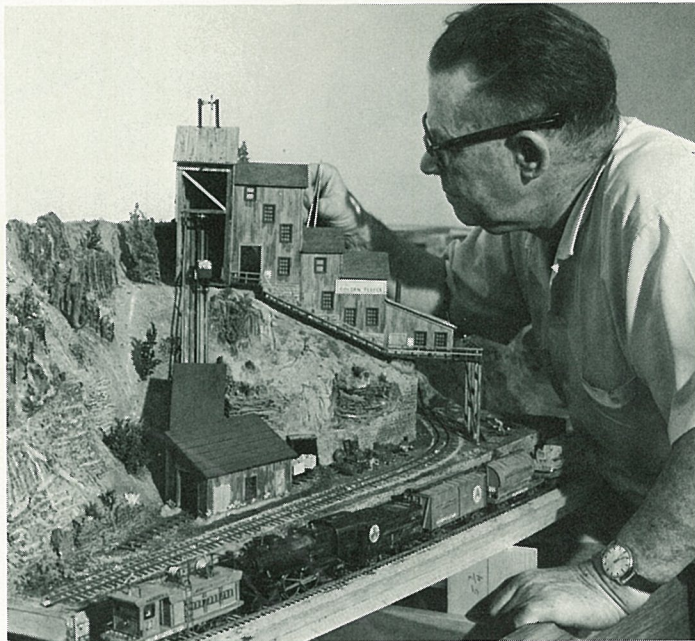
Capt. Maurice has been in the Air Force since 1959 and came to Convair Aerospace after service as a math instructor at the Air Force Academy Preparatory School in Colorado and as an internal staff auditor for the Auditor General at Lincoln AFB, Neb. He served five years as an enlisted man before attending officer training school, attaining the rank of staff sergeant as an airborne electronics repair specialist. He holds a degree in business administration from Ohio State University.



'STUDENTS'—Maj. Gary Leach, left, and Capt. James Maurice look over F-111 model as they discuss 10-month Education With Industry assignment at Convair Aerospace-SD.



NEW COLONEL—Following recent promotion in rank, it's now Lt. Col. Robert F. Putney serving as chief of Defense Contract Administration Services Office at Convair Aerospace-San Diego. Pinning on silver oak leaves during their visit to San Diego this month were Lt. Gen. Wallace H. Robinson, Jr., USMC, left, director of the Defense Supply Agency, and Brig. Gen. John S. Chandler, USAF, right, commander of the DCASR-Los Angeles.



MODEL MAKERS—Frank Hernandez, left, puts finishing touches on Golden Fleece Mine at CRA Model Railroad Club layout. In right photo, Commissioner Willard



Jones, right, watches as Roger Henkel plants "tree" as passenger train crosses in foreground. Club will be among hosts for 1974 National Model RR Assn. convention.

CRA Group Creates Intricate HO-Scale Model RR

Members of the CRA Model Railroad Club have been spending hundreds of off-duty hours in creating passenger and freight terminals, mountain tunnels and trestles, an old gold mine, and other authentic scenery and landscaping for the club's 20 by 65-foot HO-gauge railway layout in the Western Town area of Missile Park.

Willard Jones, commissioner, said about 15 of the club's 25 members work on the layout each Tuesday night with a few also working weekends. Roger Henkel of Electro Dynamic is general manager for the facility.

The club expects to have one of the finest HO-scale (about 1/8-inch to 1 foot) facilities in the U.S. by 1974 when it will be among host clubs for the National Model Railroad Association international convention in San Diego.

"A model railroad is never really finished," Jones commented. "There's always improvements to be made. That's one of the things that make it

such a fascinating hobby for people of all ages."

A recently completed scale-model passenger depot, similar in design to the Santa Fe station in San Diego, is so detailed that it includes inside lighted chandeliers, passenger benches, restaurant counter stools, and authentic looking paintings on the walls.

Frank Hernandez, a Convair Aerospace inspector, has been putting finishing touches on the detailed Golden Fleece Mine, based on photos from an 1895 railroad book of a gold mine in Nevada City, Calif. An electrically operated ore car runs up a mountain-side from the rail siding to the mine entry.

The 500-foot main line and branch-line track sections are being equipped with 100 hand-made turnouts — each requiring about five hours work.

About 35,000 to 40,000 tiny basswood ties for the tracks are stained in household dye at one time then each is glued individually to the homasote

roadbed. The commercially purchased metal rails are attached with miniature metal spikes and light gray ballast (sand) is added for track-bed realism.

The model railroad operations center will provide electrical controls for all operations and for automatic coupling for make-up of trains.

Membership in the club is open to any General Dynamics employee.

"Almost any artistic or technical talent can be utilized — and employees without technical skills can assist with general construction and enjoy use of the facility," Jones said.

SERVICE AWARDS

Service emblems due during the month of October.

CONVAIR

Thirty-five-years: Dept. 015, F. E. Grossher; 027, O. E. Mechem; 045, B. T. McMicken; 149, J. J. Swarts; 810, E. F. Stevens.

Thirty-years: Dept. 001, J. H. Hammer, K. Phillips; 015, A. Becker, C. E. Hultz, J. K. McDonough; 019, S. Rivas; 147, R. D. Williams; 149, J. C. Williamson; 193, L. Baum; 195, A. L. Hendricks; 250, S. J. Earle; 400, C. W. Banks, W. C. Cockerell, G. E. Nuss; 401, G. R. Bell, A. C. Hall, H. Tieszen; 585, S. O. Atwood; 756, A. L. Kelson; 834, E. C. Finley; 985, M. L. Gee.

Twenty-five-years: Dept. 002, E. C. Janowski; 015, P. Perrero, W. Ross, H. B. Wilson; 027, D. W. Burright; 031, R. L. Hall, M. L. McCrery; 131, G. R. Kuester; 149, C. H. Sherman; 223, M. F. Nicodemus; 250, C. C. Harper, Jr.; C. J. Lewis, Jr.; 400, D. W. Beck, M. S. Brombach; 401, S. J. Jones, M. Serniuk; 731, M. L. Ferrell.

Twenty-years: Dept. 001, E. C. Mackey; 015, A. B. Guassac, G. L. Seyler, P. H. Young; 016, E. D. Peek; 019, P. F. George; 046, A. V. Black, R. D. Hill, L. D. Shelton; 101, L. F. Anderson; 110, W. L. Van Horn; 130, B. M. Carlin, O. K. Fort, E. J. Wolf; 170, D. B. Wentworth; 190, F. M. Wynkoop; 193, D. S. Vollmer; 195, B. J. Napier; 204, R. C. Solomon; 210, M. M. Lawrence; 250, R. H. Collamer, J. Mejia, Jr.; 400, C. Lea; 401, E. Wargo; 407, G. R. Anderson; 513, F. J. Signorelli; 518, R. E. Thompson; 526, J. A. Bray, P. M. Giard, Jr.; 545, J. E. Northrop; 565, L. D. Jacobs; 810, A. W. Clark; 820, J. A. Myers; 836, R. L. Biedenbach; 860, F. S. Brown, Jr.; 950, P. V. Smith; 951, T. H. Buckley; 954, L. H. Newbrough; 956, A. G. McCullough; 967, R. P. Mikkelsen.

Fifteen-years: Dept. 027, J. F. Callahan, C. G. DaSilva, A. R. Mayes; 046, E. A. Harris, M. L. Pena, N. E. Rodgers, B. H. Wilson; 101, I. L. Dionne; 115, H. L. Obertreis; 130, R. R. Ballard, J. C. Buxton, H. E. Miller, E. M. Taylor; 131, J. B. Medina; 142, A. G. Infeld; 144, E. L. Doty, L. J. Grokost, F. J. Hogan; 146, W. F. Barto; 149, P. D. Wallman, E. J. Yannaccone; 150, J. M. Roberts; 190, C. R. Stoker; 191, C. Zuniga; 195, I. R. Kelly; 202, A. Medrano, A. Pena; 221, E. H. Adkisson, J. G. Ridley, S. M. Trepanier; 223, R. J. Donaldson, H. Jackson, Jr.; 250, E. Bojorquez, T. L. Fellner, L. E. Fitzgerald, M. L. Goolsby, B. O. Green, H. D. Hurdle, D. J. Insky, W. E. Jones, T. W. Mears, S. Misa, B. M. Nash, J. C. Rice, V. A. Stillman, J. P. White, S. H. Young; 400, K. J. Inkel, J. E. Mulrooney; 401, D. Skelly, R. J. Wilsterman; 491, G. J. Langford; 518, M. C. Chandler; 566, G. R. Dray; 570, H. Yoshihara; 572, W. J. Brask, A. Hurlich; 574, W. W. Huffman, G. R. Mabie; 575, H. R. Auten, Jr.; 759, J. Rizzo; 761, L. Kulhanjian; 810, I. L. Williams; 834, F. V. Rojas; 840, V. D. Jennewein; 850, V. M. Scroggins; 952, J. E. Horne; 953, D. E. Parsons; 954, E. A. Swanson; 958, R. M. Meyers; 979, W. E. Duke, J. C. Frazier, R. L. Goodwin; 985, W. F. Bartosh, T. M. Krieger, H. R. Pearson, J. R. Stevens; 988, R. A. Jones; 999, F. P. Bumgarner, W. J. Hankins.

ELECTRO DYNAMIC

Thirty-five-years: Dept. 565, D. F. Pearce.

Twenty-years: Dept. 652, C. D. McIntyre. **Fifteen-years:** Dept. 108, Alice M. Frost; 423, Jean L. Jones, Aurora A. Ybarra; 444, Mildred E. Tucker; 447, R. L. Barnard, M. B. Clapper, C. L. Richards; 525, E. O. Bell; 632, J. E. Bowen; 635, G. S. Stringfellow; 713, R. E. Doderio; 923, P. E. Petiford; 924, W. W. Wilimek.

DAVID LEWIS GUEST SPEAKER FOR JOINT MEETING OF MANAGEMENT CLUBS

David S. Lewis, General Dynamics Chairman, will be guest speaker Nov. 23 at a joint meeting of the Convair Aerospace, Electro Dynamic, and Stromberg DatagraphiX management clubs in San Diego.

The meeting will be in the Town and Country Hotel convention center with a social hour at 6 p.m. and dinner at 7. Tickets are being sold by boosters of the three clubs and are \$5 for members and \$6.50 for non-members.

Executive hosts for the meeting will include Frank W. Davis, president of Convair Aerospace Division; Jack L. Bowers, president of Electro Dynamic Division; and Donald A. Mitchell, executive vice-president of Stromberg DatagraphiX, Inc.

Charles Simmons is president of the Convair Management Association, Vito Sardo of the Electro Dynamic-San Diego Management Club, and Charles Sewell of the DatagraphiX Management Club.

Darwin P. Isaac, vice president-programs for Convair Management Association, said about 1,000 members, wives, and guests are expected to attend. This will make the meeting the largest ever planned by the three sponsoring organizations. Among guests will be General Dynamics employees from Vandenberg AFB, Edwards AFB, Los Angeles, and Pomona.

Recreation Notes

The CRA Archery Club will conduct instruction classes for beginners at 10 a.m., Nov. 28 and Dec. 12. Equipment will be provided by the club and lessons are open to all, free of charge. For information call Al Phipps, 295-8194.

General Dynamics Chorus is rehearsing Monday evenings at 7:30 for its annual Christmas carol tour. The chorus will entertain the CRA Rockhounds Dec. 1, and the week before Christmas plans to visit four area hospitals.

The CRA Golf Club has scheduled a turkey shoot Nov. 26, over Pala Mesa links. A \$10 greens fee includes electric cart and dinner.

A water ski trip to the Colorado River is planned by the Convair Ski Club, Nov. 19-21, with Ralph Kiger, as trip leader. The club has slated a snow ski outing during the Thanksgiving holidays (Nov. 24-28) to Mammoth Mountain; Tom Boren is in charge.



BUSY WATERFRONT—Outfitting piers at Quincy Shipbuilding present unusual sight of three major classes of vessels being readied for delivery. Left to right: 'Mount

Vernon' (LSD-39), 'Doctor Lykes', and 'Wabash' (AOR-5). Latter was recently delivered to Navy after highly favorable report from Navy INSURV Board.

Convair-SD to Build Transonic Model for Wind Tunnel Testing

Convair Aerospace Division is designing and will fabricate a scale model of a transonic airplane with jet engine simulators for use by NASA's Lewis Research Center in comprehensive wind tunnel tests to optimize rear-fuselage shape and engine locations for advanced-technology transports.

Stan Griffin, wind tunnel design group engineer who will manage the project for the division's San Diego operation, said three basic aft-fuselage configurations will be investigated, with each one incorporating a series of engine mounting patterns. The test program also will include use of instrumented flow-through nacelles in lieu of simulators and flow-field surveys with engines removed.

Two of the aft-fuselage configurations will require area ruling to give them a "pinched waist." The fuselage will be designed to allow for changes in shape in relation to engine locations. A single tail assembly will be used with each of the aft-fuselage sections.

The six-foot wings will be of a "supercritical" design. The wing tips will anchor to the sides of the 8 x 6-foot supersonic wind tunnel at NASA-Lewis to support the model during tests.

The turbo-fan jet engine simulators will be powered by individual high-pressure air lines.

The scale model will be fabricated primarily of heat-treatable stainless steel and is scheduled to be completed, bench-tested, and calibrated within one year under the cost plus fixed-fee contract for about \$450,000 from NASA-Lewis.



POSTMASTER VIEWING—U. S. Postmaster General Winton M. Blount is briefed on Electro Dynamic's mail tracer system PROMPT (Program Recording Official Mail Point Time) at 5th Annual National Postal Forum held in Washington, D.C. From left are Bernard Zipp and Ken Morgan, Electronics Operation, Thomas Donahue, assistant postmaster general, and Blount.

FB-111 Entered in 'Giant Voice' Competition

Two FB-111s will compete in Strategic Air Command's 1971 Bombing and Navigation Competition at McCoy Air Force Base, Fla. Dec. 12-17.

The FB-111 entries will come from the 509th Bomb Wing at Pease Air Force Base, N. H., and the 380th Strategic Aerospace Wing at Plattsburgh Air Force Base, N. Y.

They will compete against B-52 and British Vulcan bombers in the annual "world series" competition, which has been code-named "Giant Voice."

Maj. Robert G. Hathcock, pilot, and Maj. Donald A. Itzen, navigator, will fly the 380th entry. The 509th's entry

will be flown by Lt. Col. Robert G. Voelker, pilot, and Lt. Col. Billy R. Seals, navigator.

Alternate crews are Maj. Robert E. Reynolds, pilot, and Maj. John R. Husak, navigator, for the 380th; and Maj. Joseph Williams, pilot, and Maj. Ronald Burnett, navigator, for the 509th.

Crews at both bases are now flying practice sorties in preparation for the competition.

The FB-111 had an auspicious debut in last year's competition. One of the two entries won first place in bombing; the other entry finished second in overall bombing-navigation.

Fatigue Tests Expected To Extend Service Life of F-111 Aircraft

The F-111 tactical fighter-bomber has passed two major milestones in a program designed to extend its service life beyond the original 10-year requirement.

In fatigue tests conducted by General Dynamics' Convair Aerospace Division, the fighter-bomber wing and wing carry-through structure have withstood test loadings equivalent to 24,000 hours of flight—four times the estimated number of hours that the aircraft would actually fly in 15 years.

Fatigue testing of the wing is done at Convair Aerospace's San Diego operation while testing of the carry-through structure is done at the Fort Worth operation.

A four-to-one safety factor is employed in fatigue testing of F-111 structural components.

This means that to meet the original requirements for a 10-year service life, the wing and carry-through structure had to withstand four times the number of maneuver loadings anticipated during 10 years of operation at the rate of 400 flight hours per year—four 4,000-hour "lives" or 16,000 simulated flight hours.

In subsequent testing, the wing and carry-through structure were subjected to two additional 4,000-hour "lives" each, bringing the total to 24,000 hours for each component. This divided by the safety factor of four equals 6,000 hours—15 years of operation at the rate of 400 hours per year.

Fatigue testing will continue on other F-111 structural components until the service life of the entire airframe can be extended beyond the original requirement.

The purpose of fatigue testing is to determine the length of time that a structural component will be able to withstand the repeated loads imposed by flight maneuvers. Such repeated loads eventually produce fatigue or cracking of metals and it is in the test laboratory that engineers determine when fatigue will occur.

Electro Dynamic-SD Awarded Sonobuoy Receiver Contract

Electro Dynamic Division has received a \$2,597,655 subcontract from Lockheed-California for sonobuoy receivers.

The contract calls for production of 36 systems by the Electronics operation in San Diego. The sonobuoy receiver systems will be integrated into the ANEW anti-submarine warfare system for installation aboard the Lockheed P-3C Orion aircraft.

The system receives frequency-modulated RF signals from sonobuoys and transfers the information to data processing equipment aboard the aircraft.



ARMY SHOW—General Dynamics exhibit at last month's Association of U. S. Army show in Washington, D. C. attracted number of prominent military men. Among visitors were, left, Gen. W. C. Westmoreland, Army Chief of Staff, with Ted Lefevre, GD vice president; left center, Gen. Bruce Palmer, Jr., Army Vice Chief of Staff, with Rex Hynes, Canadair, Ltd. Displays included

Electro Dynamic's ALARM (Alerting Long-range Airborne Radar for Moving targets); MRAM (Multi-mission Redeye Airlaunched Missile system); and GRIDS (Graphic Integrated Display System). Stromberg Datagraphix showed off the DMS (Datagraphix Microsearch System) and Canadair its CL-89 drone. AUSA show was held Oct. 11-13 at Sheraton Park Hotel.

General Dynamics World

Vol. 1, No. 8

GENERAL DYNAMICS CORP. — SAN DIEGO 4178 December 7, 1971



BUILDER'S TRIALS COMPLETED—S.S. Doctor Lykes, Quincy Shipbuilding Division's first in a series of three of the world's largest dry cargo ships, successfully completed builder's trials off Massachusetts coast during the

weekend of Nov. 13. Only official trials and acceptance by the customer remain before 'Doctor Lykes' enters service on European cargo routes of Lykes Bros. Steamship Co., Inc., New Orleans-based shipping firm.

Executive Changes At Convair Aerospace Announced by Davis

Three executive appointments which place emphasis on important new business opportunities at General Dynamics' Convair Aerospace Division have been announced by Frank W. Davis, division president.

Lyman C. Josephs has been appointed vice president and program director of the Air Force prototype lightweight fighter program. Industry competition for the new program, on which Convair Aerospace will bid, is expected to begin shortly. Josephs formerly was vice president of long range planning.

John E. Goode, formerly director of systems technology, has been named vice president of aerosystems technology and development. In that post, he is responsible for expanding the division's market in special avionics projects and system integration programs which have been developed by Convair Aerospace over the past several years.

Kenneth E. Newton has been named vice president and program director of launch vehicle programs. He formerly was director of launch vehicle programs. Newton is responsible for extending and expanding the Atlas space launch vehicle, Centaur high-energy upper stage and Orbiting Vehicle programs for the division.

S-C Charlottesville Production Rising To Record Levels

For the past several months production at the Stromberg-Carlson plant in Charlottesville has been running at record levels with each month showing an increase in output over the previous month's.

Clyde A. Ford, S-C vice president - plant operations, reports that Charlottesville plant output reached an all-time high in October due to record orders for all types of telephone instruments and other Charlottesville products.

Tom Worthy, vice president - marketing/customer service, attributed the increases in orders to several factors. "Independent telephone companies have found our instruments highly suited to their needs," he said, "and their business is expanding rapidly." Worthy also noted that Stromberg-Carlson Sales personnel have pursued orders more aggressively in 1971. "We look forward to record (Continued on Page 2, Col. 1)

Heinemann Recipient of Navy's Highest Public Service Award

Edward H. Heinemann, a vice president of General Dynamics, received the Navy's Distinguished Public Service Award Nov. 17. The presentation was made in Washington on behalf of Secretary of the Navy John H. Chafee by Dr. Robert A. Frosch, Assistant Secretary of the Navy for Research and Development.

Heinemann was cited for his "outstanding contribution to the United States Navy in the field of aircraft development" and for his efforts as a 15-year member of the Naval Research Advisory Committee. As chairman of the committee from 1969 to 1971, the award noted, he "directed work of exceptional significance to the Secretary of the Navy, the Chief of Naval Operations, and the Chief of Naval Research."

The award commended Heinemann for providing "valuable advice and assistance on problems and policies concerning Naval research programs" and for advocating "simplicity in the

complex field of aircraft development. He has made an outstanding contribution to the design, development, and production of superior carrier-based aircraft."

The Navy's Distinguished Public Service Award has been given annually since 1947 to individuals who have "rendered exceptionally outstanding service which directly affects the Department of the Navy." It is the Navy's highest award to a private citizen, and excludes all Navy Department employees. Some 10-15 recipients are named each year.

Heinemann, a vice-president of General Dynamics since 1962, was previously vice-president—military aircraft for Douglas Aircraft Co. He was responsible for the design and development of a wide variety of aircraft, including the A-24 and A-26 bombers, F3D fighter, A2D, A3D and A4D attack bombers and F5D Sky-lancer.

Together with Astronaut Neil A. Armstrong and Andrei N. Tupolev of the Soviet Union, Heinemann was recently named an Honorary Fellow of the American Institute of Aeronautics and Astronautics.

He is also a fellow of the Royal Aeronautical Society, and received the Collier trophy in 1953.



DISTINGUISHED—Assistant Secretary of the Navy for Research and Development Robert A. Frosch pins Distinguished Public Service medal on E. H. Heinemann, GD vice president, and, along with Mrs. Heinemann, extends congratulations in Washington, D.C. ceremony. Citation is signed by Navy Secretary John H. Chafee.

Fort Worth Operation Authorized to Modify 24 F-111C Aircraft

The Air Force has given Fort Worth operation long-lead authorization to get ready to modify and refurbish 24 F-111C aircraft.

The authorization will enable the operation to lay detailed plans for the modification program, which is expected to start in February, 1972, and continue through October, 1973.

"The authorization has nothing to do with the Australian government's decision to purchase—or not to purchase—the 24 F-111C aircraft," said A. S. (Doc) Witchell, program director F-111A, C, D, E and F. "It simply gives us adequate time to prepare for the modification task, which will be carried out in any case."

Mainly, the long-lead authorization will enable Fort Worth to accumulate and prepare modification kits for engineering changes on the aircraft. The go-ahead will also permit the operation to make plans for non-destructive testing, crew-loading, tooling, and facilities, work-loading and task integration.

Meanwhile, the program that was started last April to conduct non-destructive testing of the F-111Cs and make engineering changes on the F-111C wings, is moving along on schedule.

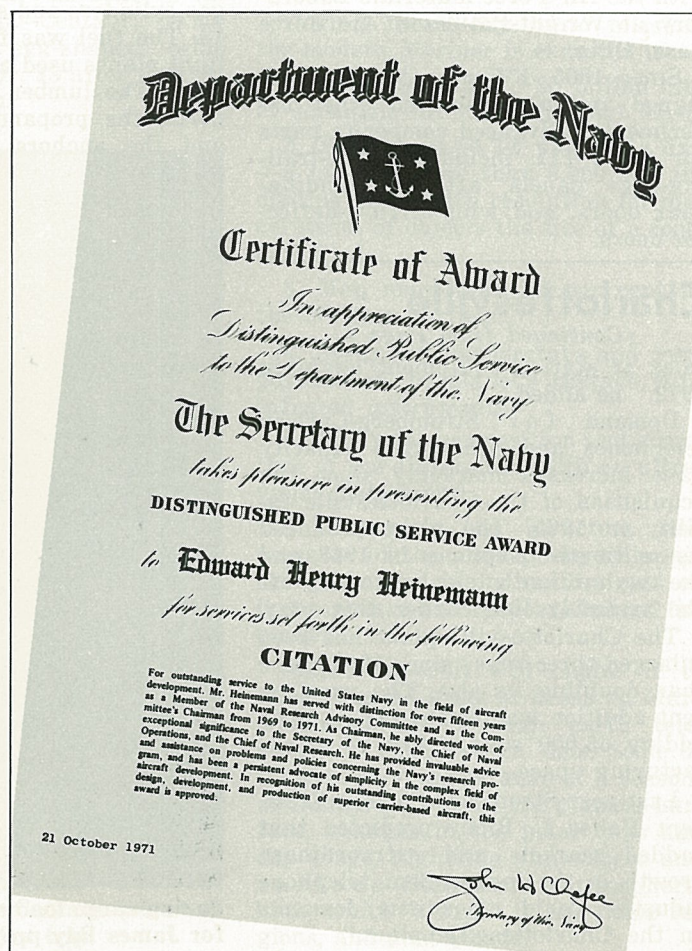
DatagraphiX Names International Firms For Finland, Israel

The DatagraphiX international marketing organization has announced that two new DatagraphiX distributorships have been awarded to companies in Finland and Israel.

Mikro-Filmi-Oy of Helsinki, Finland, recently signed a contract to handle all DatagraphiX COM products for Finland. The company is under the direction of Vesa Hiltunen.

A Tel Aviv, Israel-based company, S.I.G. International, has contracted to handle the DatagraphiX COM product line for Israel. Managed by Shlomo Barr, Tuvia Gruber and Giora Shulman, S.I.G. is also the distributor in Israel for the Electro Dynamic Division of General Dynamics.

According to Fred Walz, DatagraphiX international marketing manager, "these two new distributorships bring the total number of DatagraphiX distributors to seven. Other companies with distributorship agreements are in Japan, Australia, Taiwan/Hong Kong, Brazil and South Africa.





CORAL SEARCH—Star II, Electric Boat Division's research submersible, performs undersea inspection during one of her more than 250 dives. Star II recently brought back coral samples while diving off Hawaii.

Star II Submersible Diving for High Value Coral off Hawaiian Islands

Electric Boat Division's research submersible Star II recently made a dive to 1,200 feet off Hawaii, bringing back samples of gem grade coral, a material of potentially high value in jewelry manufacture.

The dive was made under the auspices of Makai Range, Inc., now operating the two man vessel under lease from General Dynamics. It is not reported that the submersible brought back a commercial quantity of coral on this exploratory dive, but the choicest grades command thousands of dollars an ounce in oriental markets.

Star II (the acronym stands for Submersible, Test and Research) has made over 250 dives since launching in 1966. One of seven research submersibles built by Electric Boat Division, it is 17.7 feet long and weighs five tons. In addition to its 1,200-foot depth capability it can cruise at 2.3 knots (about walking speed) and remain submerged 10 hours.

Equipped with manipulator arms developed by the company, it can do a variety of underwater tasks in addition to inspection, observation and photography.

Unemployed Technical Personnel Retrained For Nuclear Jobs

Unemployed aerospace engineers and technicians are being retrained as testing technicians in Convair Aerospace Division's School for Non-destructive Testing to qualify them for new jobs in the nuclear power industry throughout the United States.

The California Department of Human Resources in conjunction with the Federal Manpower Development Training Act is funding the five-week retraining program, providing a weekly allowance for each student, and in some cases providing relocation costs for graduates being employed in other states.

K. M. Boekamp, who directs the school for Convair Aerospace Division, said there is a present critical need for nondestructive testing (NDT) technicians in the nuclear power field and that thousands of such technicians will be needed in future years as new reactors are designed, constructed, and begin operation.

"More funds have been spent in the nuclear power field during the past decade than to take man to the moon," Boekamp commented. "Surveys of nuclear power companies and related testing laboratories indicate there will be a particular need for skilled NDT personnel for at least the next 10 years."

Unemployed aerospace technical personnel enrolling in the NDT school must be willing to relocate to other areas of the U.S. and must have knowledge and experience in one of the following specialties: mechanical engineering, welding and heavy metal fabrication, metallurgy, or quality control and quality assurance.

The five-week program includes intensive classroom and laboratory training in quality assurance and radiographic, ultrasonic, magnetic particle, eddy current, and liquid penetrant testing methods.

The first NDT school class to include students from the state-funded program began Sept. 20. A new class of 12 students, including six unemployed aerospace personnel, is scheduled each month.

Although the school initially was established to meet General Dynamics and specialized Department of Defense needs, it was expanded in 1968 to provide training for employees of commercial airlines, other industries, utilities, and governmental agencies.

Big Boron Component Successfully Tested Beyond Design Load

Fort Worth operation has built and static-tested an experimental F-111 advanced composite aft-fuselage to 130 per cent of ultimate design load.

The fuselage—largest composite component built so far—was about 14 feet long and weighed nearly 1,000 pounds. It was 19 per cent lighter than the regular steel and aluminum fuselage, yet as stiff and strong.

Made mainly of graphite-epoxy, the composite fuselage also had "significant applications" of boron-epoxy and boron-aluminum epoxy.

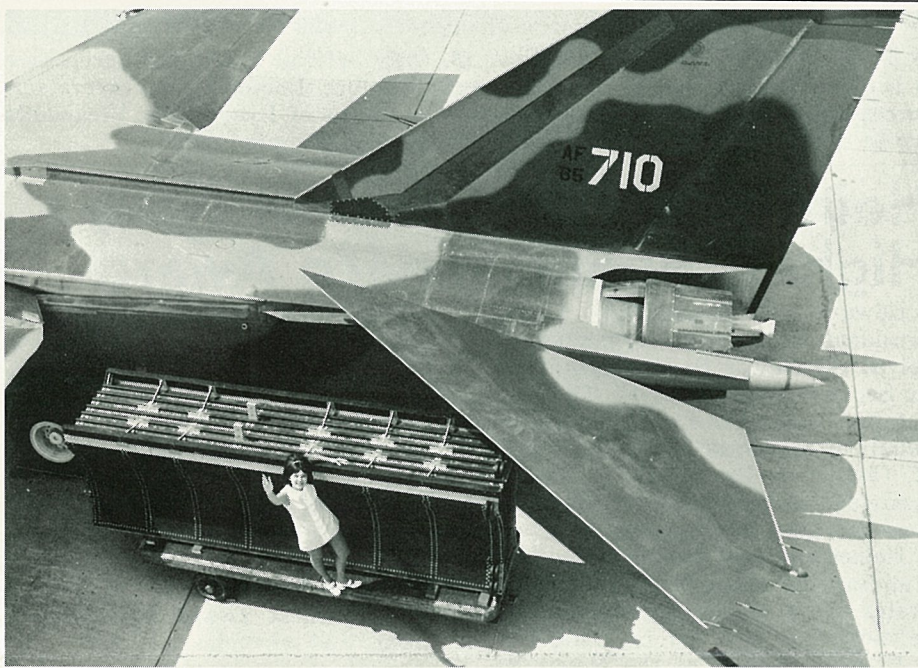
"Test results indicate that the composite fuselage could withstand loads 30 per cent greater than the severest design loads," said P. D. Shockey, Dept. 64-7, project structures engineer.

The advanced composite part simulated the center fuel cell of the aft fuselage, which is located between the two engines. This section is designed to withstand concentrated loads from the horizontal and vertical tails, fuselage shear and bending loads, and fuel pressure.

The aft bulkhead of the composite component weighed 25 per cent less than the regular steel part. Tests revealed that the bulkhead had a fatigue life "far in excess of requirements."

The project was carried out under a research and development contract with the Air Force Materials Laboratory at Wright-Patterson Air Force Base, Ohio.

Since 1965, FW operation has designed and manufactured other experimental advanced composite parts for the F-111, including wing-trailing-edge panels, aft main-landing-gear doors, and wing-airflow-deflector doors.



HUGE COMPOSITE—This experimental F-111 aft fuselage of advanced composites (on trailer) was built and successfully static-tested at Fort Worth. The component represents the aft center body between the two engines.

Bulk Supplies Airlifted by Canadair CL-215s In Support of Far North Hydroelectric Job

Five Canadair-built CL-215 aircraft, owned by Quebec Air Service, recently airlifted fuel, propane gas and lumber from Val d'Or to points in Northern Quebec to support Quebec Hydro advance survey and construction teams working on the James Bay hydro project. Val d'Or is about 400 miles northwest of Montreal.

The CL-215s completed airlifting 1,200,000 lbs. of fuel, five plane loads of lumber, nearly 40 tons of propane gas cylinders and six anchors on Oct. 13. The fuel was for helicopters and light planes used at the various work sites. The lumber was for tent supports, the propane gas for heating, and the anchors to hold docks in place.

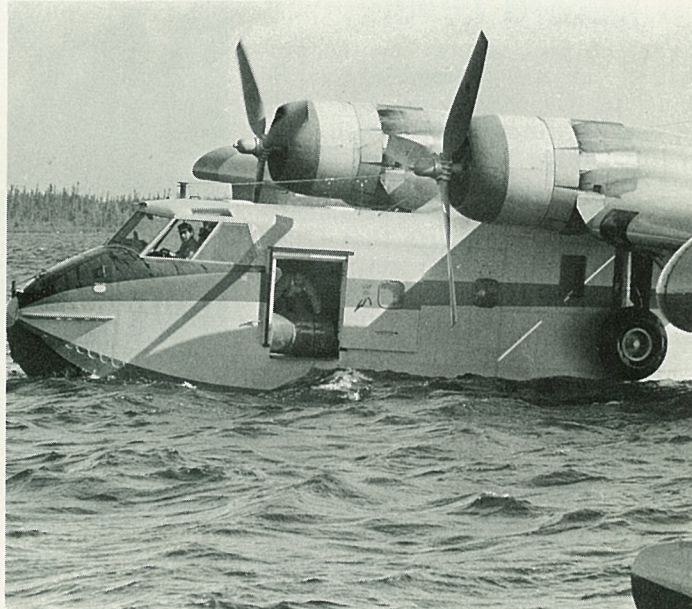
The airlift began Sept. 4 with four

aircraft. A fifth plane was later added. Each flew a load of 12 or 13 drums of fuel two or three times a day to sites as far as 340 miles to the north of Val d'Or and averaged ten hours flying per day.

Speed was essential to beat the freeze-up which sets in around mid-October. The range, payload and amphibious capability of the CL-215 answered the need in the operation since all sites were situated on the edges of lakes and fuel for heating and powering helicopters and light planes had to be moved hundreds of miles to the work stations before the cold weather. Without the airlift, work would have been held up until January when ice on the lakes could support heavy land vehicles.



AIRLIFT—Early morning activity was brisk at Val d'Or during cargo loading of CL-215s. Barrels of fuel oil slated for James Bay project are shown at left. Right, off-load-



ing of barrels rolled out forward door into water are later retrieved and floated to shore. Versatile CL-215 airlifted about 600 tons of supplies to James Bay sites.

Charlottesville . . .

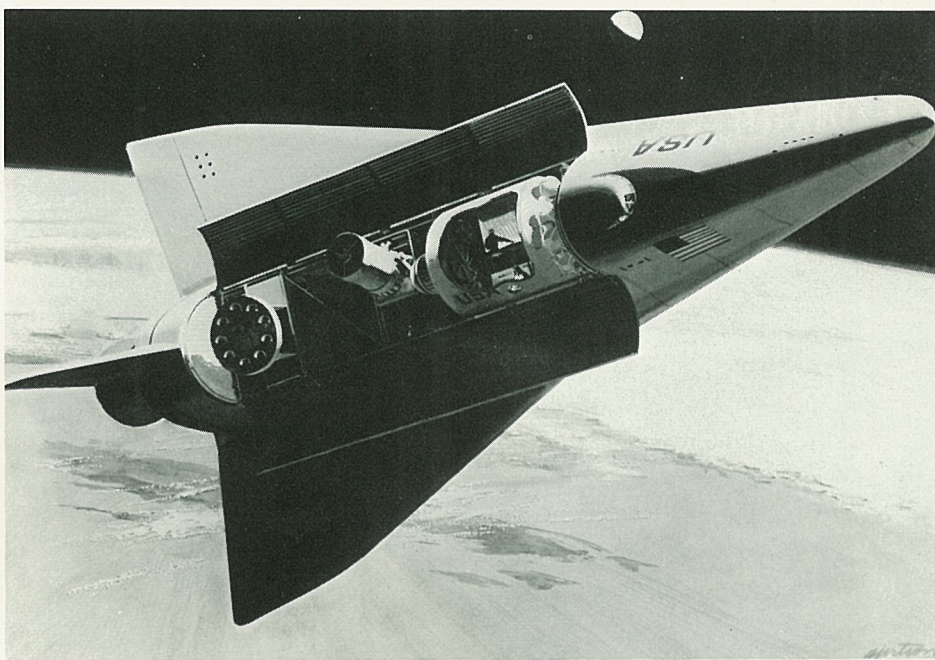
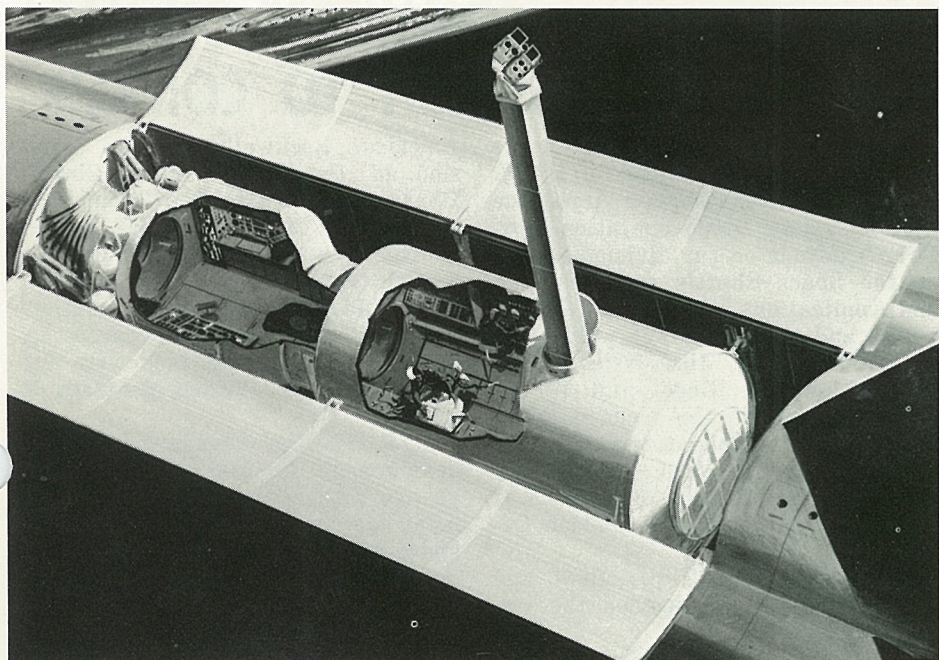
(Continued from Page 1)

sales of station equipment again in 1972," he added.

Demand for Stromberg-Carlson telephones and production capacity have increased markedly since the acquisition of the Charlottesville facility in 1965. The plant produced its millionth telephone in 1968 and the two millionth telephone came off the assembly line earlier this year.

The Charlottesville plant has been enlarged three times since 1965, more than doubling its size. The most recent addition was completed in 1970, adding 65,000 square feet of manufacturing space.

Last year Stromberg-Carlson President Dause L. Bibby predicted that "added markets and extraordinary growth in the independent telephone industry would place new demands on the Charlottesville plant."



RAM APPLICATIONS—Artist's concept, left, shows Research and Applications Modules in Space Shuttle orbiter cargo bay being used for orbital surveys of earth and its environment and includes support module at right and a payload module. Concept at right depicts RAM pallet at left and its support

module, also in shuttle orbiter, being used as a manned orbiting observatory. Pallet carries instruments for making stellar astronomy observations (aft cluster of domes) and an ultraviolet telescope mounted at center of bay. RAM team recently completed concept evaluation task for NASA.

CONCEPT ANALYSIS AND EVALUATION FOR RAM COMPLETED BY CONVAIR-SD

The Research and Applications Module (RAM) team at Convair Aerospace Division's San Diego operation recently completed the concept analysis and evaluation task under its NASA Phase B contract in which detailed analysis was made of 47 different concepts for RAM structures.

Plans for the RAMs, manned and unmanned space labs to be used in conjunction with the reusable Space Shuttle orbiter and a space station, are being developed under a \$2 million NASA preliminary definition contract. RAMs are to provide facilities for in-space investigations in many scientific fields.

Wallace W. Withee, program director, said the team had selected four basic elements or "families" of RAMs recommend to NASA task force and working groups in Huntsville, Ala., in a series of presentations on Nov. 16.

Included were a versatile sortie pallet, two versions of shuttle sortie modules, two versions of payload modules, and a free-flying module. On a sortie mission the shuttle stays in orbit up to seven days supporting RAM elements.

Sortie Modules

Sortie modules, envisioned as 17½ ft. long (10 foot long constant-diameter tank section) and 14 feet in diameter, would operate attached to the shuttle orbiter. In one configuration experiments would be performed in them. In the other configuration they would act as a system support module for experiments performed in a separate payload module.

The payload modules would operate either in the shuttle sortie mode as described above or attached to a space station. They have been considered in the study in 17½, 31½ and 47½ ft. lengths, each 14 feet in diameter. The free-flying modules are envisioned as being both 12 and 14 feet in diameter and having lengths of 17 and 21 feet.

About 300 government and industry representatives will be briefed on the recommended configurations Wednesday (Dec. 1) at NASA's Marshall Space Flight Center in Huntsville. A

presentation also is planned later the same day for Dr. Eberhard Rees, director of NASA-Marshall, and his staff.

Similar presentations are scheduled Dec. 10 in Washington, D.C., for the RAM steering group and executives at NASA Headquarters.

R. A. Johnson, who has responsibility for business operations for the Convair Aerospace-SD RAM program, said international agreements are being worked out for participation in the RAM detailed pre-design task by Messerschmitt Bolkow Blohm and ERNO of West Germany, SAAB of Sweden, and MATRA of France. Representatives of MBB, ERNO, and SAAB were scheduled to be in San Diego during the past few days to discuss their possible roles in the program.

Foreign Funded

Each of the foreign firms will have its work funded by its own government. Each also will have a representative on the Executive Steering Committee chaired by Frank W. Davis, president of Convair Aerospace Division.

Johnson said about 100 personnel are currently assigned to the 15-month RAM Phase B program at the Kearny Mesa plant in San Diego. Included are about 20 personnel from three major subcontractor firms — North American Rockwell, Bendix Aerospace, and TRW Systems.

The Convair Aerospace-SD team is to begin work within a few days on an engineering mockup of a RAM unit. "This will be a working type of mockup to serve a wide range of purposes during the detailed pre-design task," Withee said.



IT'S "D" DAY—First F-111D delivered to the 27th Tactical Fighter Wing at Cannon AFB, N. M., is christened "City of Clovis" by Mrs. Charles E. Francis, wife of wing commander, aided by Lt. Col. Thomas D. Portanova, Exec. of 27th. Assistant Secretary of the Air Force Philip N. Whitaker attended.

Study of Planet Mars Begins After Lengthy Modern Mariner 9 Voyage to Distant Planet

Thanks in part to a precision launch by Convair Aerospace Division's Atlas-Centaur 23 last May, U.S. scientists are beginning to study what one has called an "information explosion" about the planet Mars.

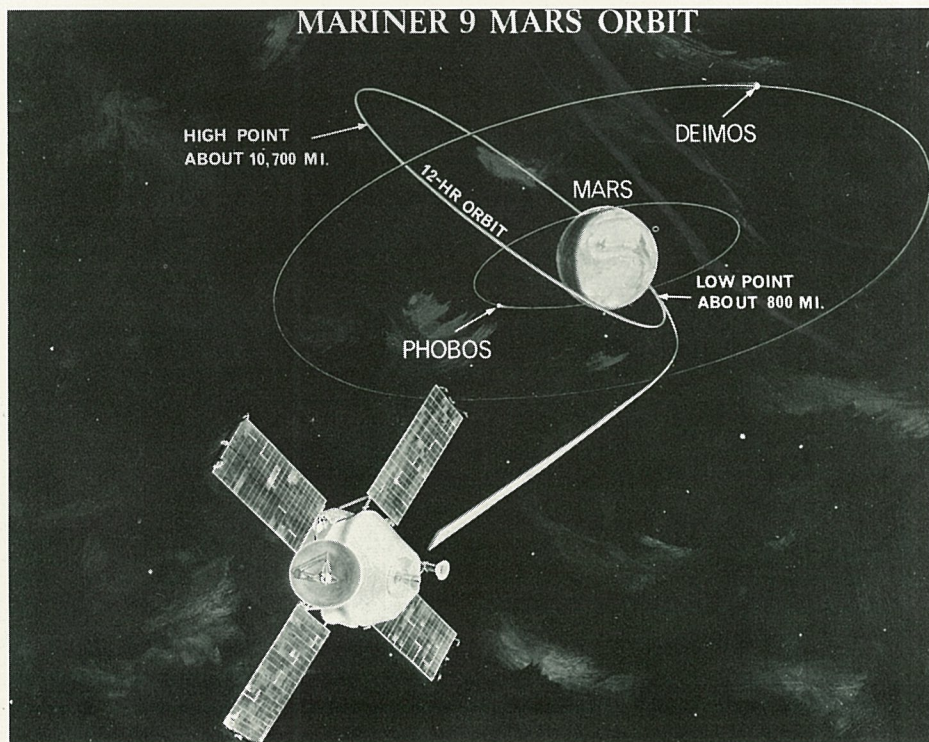
Mariner 9, which was sent on its way by the Atlas-Centaur, was braked into its egg-shaped orbit around Mars on Nov. 13 after its 167-day trip from earth.

Frank W. Davis, president of Convair Aerospace Division, and Mrs. Davis were among guest observers at Jet Propulsion Lab in Pasadena, Calif. when the Mariner became the first spacecraft to go into orbit around Mars.

During its 90-day basic mission, the modern Mariner is expected to:

1. Radio back 25 to 30 billion bits of scientific information about Mars.
2. Take about 60 TV pictures a day—a total of more than 5,000 and including many with resolution for discernment of objects the size of a football field.
3. Map more than 70 per cent of the Martian surface.
4. Study the temperature and composition of the planet's surface with infrared instruments.
5. Study the composition and structure of the atmosphere with an ultraviolet instrument.
6. Determine the structure and pressure of the atmosphere by measuring changes in its radio signal as it disappears and reappears behind the planet.

Mariner's orbit will enable it to take repeated looks at areas on Mars which appear through earth telescopes to change with time. Some of these are the appearance of a seasonal change in color of the planet's surface, changes in the polar caps and cap edges, nightside atmosphere and surface fluorescence, atmospheric haze, white "clouds" in non-polar regions, and dust clouds.



MARTIAN SWINGER—NASA artist's concept shows Atlas-Centaur-launched Mariner 9 as it swings into orbit around Mars after 167-day trip.

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Bill Levering—Editor

Jack Isabel—Associate Editor

Convair Aerospace · Electro Dynamic San Diego



CABIN CONFERENCE—Congressional NASA Oversight Subcommittee staff personnel toured Space Shuttle booster crew station mockup during recent visit to Convair Aerospace-SD. In cockpit, from left, are Hal Gould, Jim Wilson, and Herb Rogers of Convair Aerospace. Looking on, from left, are (back row) Joe Del Riego and W. H. Boone and (front row) Bernard Johnson, M. C. Curtis of Convair Aerospace, and Gerry Mossinghoff.

Quick Action By Schollian Averts Possible Damage to DC-10 Fuselage Section by Crane

Richard L. Schollian, a Convair Aerospace-SD Dept. 043 aircraft assembler, has been awarded a National Safety Council pen and pencil set for having taken quick action to prevent damage to a DC-10 F-G fuselage section.

Dick Schulz, senior safety engineer, said Schollian was working on the top level of a DC-10 fixture when he noticed an overhead crane being moved with its hook down. The hook caught and bent a safety rail then slipped off and started swing-

ing toward the fuselage section. Schollian shouted a warning and grabbed the hook, his quick action preventing damage to the fuselage section.

Participating in a brief ceremony later in which the pen and pencil set was awarded were Del Dimmitt, chief of safety and fire; Schulz; Jim Ames, general foreman of the F-G line; and Larry Griffith, Dept. 043 foreman.

Schulz said the safety section's emphasis on submission of near-miss and minor property damage accident reports has resulted in 155 such reports being submitted this year—compared to 10 last year.

"Having near-miss accidents reported enables the safety section and departmental supervisors to take any corrective action needed to help ensure such mishaps will not occur again," he said.

TYPEWRITERS FOR SALE

A number of Olympia standard typewriters will be offered for sale at a fixed price at the next employees sales day at the materials salvage yard, LF plant, Dec. 11. Hours are from 8 a.m. until noon. Entrance is by badge.

Expanded Program For Spring Courses

Educational services will offer an expanded program of San Diego Evening College spring semester courses at the Kearny Mesa and Lindbergh Field plants to accommodate first and second-shift Convair Aerospace, Electro Dynamic, and Stromberg Data-graphix employees.

Included for the first time will be courses leading to a Certificate in Industrial Technology and a course in Micrographics.

Hal Rubin, coordinator for the Evening College courses, said plans are for Introduction to Supervision, Electronic Drawings and Circuit Schematics, and Micrographics courses to be given at Kearny Mesa.

Seven Supervision courses, two Shop Math courses, two Blueprint Reading courses, a Shop Production Planning course, and a Manufacturing Equipment course are planned at Lindbergh Field.

New brochures on the Industrial Supervision and Production Technology certificate programs are available from educational services offices—ext. 2564 LF or 1329 KM.

For information on General Dynamics World contact Convair Aerospace San Diego Public Affairs Dept., ext 3322KM, or Electro Dynamic San Diego Public Affairs, ext. 3189KM.

CONGRESSIONAL COMMITTEE ON NASA OVERSIGHT PAYS VISIT TO CONVAIR

Four staff representatives of the Congressional Subcommittee on NASA Oversight visited Convair Aerospace Division's San Diego operation Nov. 9 for briefings on the division's work on the Space Shuttle and Research and Applications Module (RAM) programs and the Space Tug study.

Included were Jim Wilson, Hal Gould, Joe Del Riego, and W. H. (Dan) Boone of the Congressional Science and Astronautics Committee staff who were accompanied by Gerry Mossinghoff and Bernard Johnson of the NASA Congressional Liaison Office.

M. C. Curtis, vice president and general manager, welcomed the visitors.

H. F. Rogers, Space Shuttle program director, briefed the group on work being accomplished by the division as a subcontractor to North

American Rockwell under an extension of the NASA Space Shuttle Phase B contract. The group also toured the full-scale Space Shuttle booster crew station mockup in Bldg. 5 at the Kearny Mesa plant.

Findings and recommendations from the RAM program concept analysis and evaluation task were outlined by W. W. Withee, program director.

P. J. O'Leary, manager of program development for launch vehicle programs, discussed a six-month study being conducted by Convair Aerospace-SD for NASA on feasibility of using a modified Centaur vehicle as an unmanned Space Tug or Orbit-to-Orbit Shuttle vehicle. The Centaur would be carried into space in the Space Shuttle orbiter cargo bay then would be fired to send payloads into higher or interplanetary orbits.

Bartered Tuffet Leads to 'Big Deal' For McCains on Network TV Show

Television viewers across the country last month saw Ella McCain of Electro Dynamic-SD, dressed as Little Miss Muffet, parlay her tuffet to a "big deal" on "Let's Make A Deal" on the ABC-TV network. The show actually was recorded Oct. 14 in Hollywood.

Mrs. McCain, a materials investigator for Electro Dynamic's Dept. 566, and her husband, Donnie, a police detective who went dressed as Panama Pete the gambler, waited 26 months for tickets then were selected from 450 costumed participants for two of 62 places on the "trading floor."

Monty Hall, the show's master of ceremonies, traded Mrs. McCain a new car for her tuffet—which ultimately was bartered for a nine-foot stereo and game table set and then for a chance at the "big deal" behind one of three doors.

The McCains selected Door 2 to win the "big deal"—a 26-foot travel trailer valued at \$3,308; 1,000 gallons of gasoline worth \$350; and a carton of low-calorie shrimp retailing at \$20. Delivery of the trailer from the factory is scheduled in 90 days.

Enthusiasm was credited by Mrs. McCain for their selection to compete and said she and her husband were exhausted when the show ended. "It was the most exciting time of our

lives," she commented, "and the first time I've seen Donnie literally speechless."

Oh yes, the tuffet? That's a small stool that Hall sat on for several minutes while doing the show.



TUFFET TRADERS—Ella McCain of Electro Dynamic-SD and her husband, Donnie, parlay a tuffet to the "big deal" on TV's "Let's Make A Deal."

Convair Son Presides as Chargers 'Water Boy'

Ricky Rivera, 12-year-old son of Jose M. Rivera, Dept. 046-0 structural assembler for Convair Aerospace-SD, presided as "honorary water boy" during halftime ceremonies at the Oct. 31 ecologically-themed football game between the San Diego Chargers and New York Jets.

Young Rivera, a seventh grader at O'Farrell Junior High, was among more than 1,000 boys between eight and 13 who submitted entry forms for the "honorary water boy" drawing sponsored by Sea World and the Chargers.

As the winner, he received a Chargers sweatshirt, autographed football, and souvenir water bucket from quarterback John Hadl at a sportscasters and sportwriters luncheon and rode on a float at the Chargers-Jets game.

Ricky, his parents, and his three brothers also received gold passes for admission to Sea World for a year and tickets for the game.

In-Plant Voter Registration

As a service to General Dynamics employees, arrangements are being made by Electro Dynamic Division-SD to establish voter registration facilities at the Kearny Mesa plant.

Employees who are interested in becoming a deputy registrar should contact Patty Lucas, ext. 2975 KM, for information.

During a visit to Sea World, Ricky also got a kiss from Shamu the killer whale, tried his hand at feeding and watering the baby walrus, and got acquainted with "Chester the Chimp" and other "stars" at the aquatic wonderland.

The "water boy" contest was part

of a special Chargers and Sea World "Save Our Seas" program aimed at calling attention to the city's awareness of water pollution problems.

Ricky was president of his sixth grade class and sergeant of the safety patrol last year at Encanto Elementary School.



THAT'S OUR BOY—Ricky Rivera, 12, son of a Convair Aerospace-SD employee, gets pass for a year's admission to Sea World from 'Chester the Chimp' after winning "honorary water boy" contest for ecologically-themed football game between the San Diego Chargers and New York Jets.

Recreation Roundup

Pedal pushers in the CRA Bicycle Club have planned two more outings for December—a 12-mile jaunt Dec. 26 and a 50-mile trip with date to be announced. For information call Bob Williams, ext. 1626 KM.

★ ★ ★

CRA Chorus will visit University Hospital Dec. 13, Navy Hospital Dec. 15, and Mercy Hospital Dec. 17 on their annual Christmas carol tour. Special arrangements for the Chorus to visit Convair employees or relatives in the hospital may be made by contacting Jim Pate, ext. 3035 KM.

★ ★ ★

Members of the CRA Hi-Fi Music and Organ Club enjoyed a Thanksgiving outing at Scotty's Castle near Death Valley, where they played the pipe organ both Friday and Saturday evenings.

★ ★ ★

The CRA Ice Skating Club invites you to join them each Thursday, 6:15-7:45 p.m. at the House of Ice, Interstate 8 and Lake Murray Blvd. A flat rate fee of \$1 includes skates and skating.

★ ★ ★

Terry Kell, CRA golf commissioner, has announced a schedule of dates for the Golf Club's 1972 tournaments. Starting times for each event may be made by calling the CRA Clubhouse, ext. 1111 KM.

Schedule: Jan. 22-23, Hidden Meadows; Feb. 12-13, Cottonwood; March 25, Torrey Pines (Mickey Mouse); April 15-16, Fletcher Hills; May 6-7, Chula Vista Muni; June 17-18, Bonita.

July 15-16, Coronado; Aug. 12-13, Los Penasquitos; Sept. 16-17, Singing Hills; Oct. 14-15, San Carlos; Nov. 24, Rancho Bernardo (turkey shoot); Dec. 23, Cottonwood (plant championship).

Honor Camp Inmates Trained by Convair-SD Given Regular Jobs

Twenty-five San Diego County Honor Camp inmates received classroom and on-the-job training at Convair Aerospace Division's San Diego operation while still under sentence last spring and now hold regular jobs with the division.

Jack Croft, chief of educational services, said most of the 25 were among 600 trainees employed during a four-month period and given two to five weeks of classroom and 13 weeks of on-the-job training as aircraft assemblers on the DC-10 program.

No distinction was made between the inmates and other trainees after they were employed.

The inmates, including two women, all had less than four months to serve and were without skills that would enable them to secure employment after their release. They lived at the Honor Camps' Work Furlough Center or a nearby women's facility in San Diego until their sentences were completed.

From their Convair Aerospace earnings, they paid the county for their room and board, reimbursed the Welfare Department for family support, made payments on personal debts, received an allowance for bus fare and lunches and incidentals, and placed remaining funds in a savings account until time for their release from custody.

Interviews

They had been selected for employment and the training program at Convair Aerospace after being interviewed at the Work Furlough Center by Dick Garren and Don Wilde of the employment section of industrial relations. One-half of their training cost was provided through federal funds administered by the Mayor's Committee for Jobs, Inc.

"This was a real breakthrough for our rehabilitation program," said Frank Woodson, director of San Diego County Honor Camps.

"The purpose of our whole Honor Camp system is to return offenders to a constructive life in the community," he said. "We've proven



NEWEST GUPPY—Aero Spacelines' Guppy-201 has been awarded FAA certificate after successful completion of an extensive Convair Aerospace developed flight test program. First of the new 201s will be used in Europe.

SD Aids in Certification of New Guppy

Convair Aerospace Division's unique expertise in commercial transport certification "paid off" recently when the Federal Aviation Agency issued a type certificate for Aero Spacelines' Guppy-201, an improved turbo-prop version of the Super Guppy.

Joseph H. Conway, who has been responsible for the project for Convair Aerospace-SD, said division personnel worked under a \$700,000 time and material contract from Aero Spacelines in providing consultation, preparing the original 12-month flight test program, processing and analyzing data, and preparing performance information on the giant craft for FAA approval.

Convair Aerospace representatives were in Santa Barbara for special ceremonies in which FAA officials presented the type certificate, which

indicates the flying behemoth meets all cargo carrier airworthiness requirements.

The Guppy-201, a drastically modified Boeing 377/C-97 with turbo-prop instead of reciprocating engines, is patterned after the earlier Super Guppy which airlifts large space hardware components for NASA and has been used to transport DC-10 fuselage sections from the Convair Aerospace Lindbergh Field plant in San Diego to McDonnell Douglas in Long Beach.

Guppy-201 has the largest single cargo compartment of any aircraft—more than 25 feet in diameter and 111 feet long. Usable cargo space is 39,000 cubic feet—eight times more than that of the original C-97. Maximum payload is 54,000 pounds and the nose swings open 110 degrees for total frontal access to the cargo bay.

The new craft measures 144 feet from nose to tail and has a 156-foot wingspan. It has a cruising speed of 290 miles per hour and a range of about 2,000 miles.

Conway said Convair Aerospace personnel provided consultation and technical support at Aero Spacelines' Santa Barbara facility, where the plane was modified to its new configuration; at Edwards AFB, where some of the flight tests were conducted; and in San Diego where the data was processed.

The craft was put through high-speed dives, more than 600 stalls, three-engine takeoffs, climbs, and other demanding exercises during the 451-hour flight test program.

Murray Edelstein, former Convair Aerospace-SD flight test group engineer, managed the project before his death in July.

Other flight test personnel with key roles included Ed Strehlau, Gene Whigham, Tom Fleck, Bill Stark, Mike Dutcher, Ray Minutello, Joe Stengel, Wiley Huffman, Gary Clark, Paul Canegaly, and V. M. Schwoerke.

Chase pilots H. R. Auten and H. N. Murphy with aerial photographer W. F. Carter provided coverage during testing. Technical support was provided by Stan Piszkin, Jr. and G. J. Fatta, Jr. of the aerodynamics group and G. L. Getline of the dynamics group.

Assisting with instrumentation were H. D. Jeter, Lyle R. McClain, R. J. Dunn, M. F. Tidmore, E. J. Flint, Jr., S. L. Bettis, and M. F. Salefski. W. J. Ellison assisted with logistics and John Holland and L. J. Solheid with service publications.

SERVICE AWARDS

Service emblems due between Nov. 1 and Nov. 15 1971.

CONVAIR

Thirty-year: Dept. 002, E. E. Rinks, 015, G. L. Ford, 016, E. O. Barnes, 031, L. Hudson, 042, G. G. Elo III, 044, D. L. Cook, 143, H. A. Benner, 147, J. E. Cook, 222, J. H. Lewis, L. R. Nieder, 400, R. Gattishall, 401, T. F. Suter, 460, C. W. Lockerm, 491, E. Catton, Jr., 526, J. A. Lasater, 566, J. H. Ruszat.

Twenty-Five-Year: Dept. 001, M. S. Cole, 043, C. D. Herrera, 046, C. C. Fitzgerald, 147, M. G. Torbett, 202, G. H. Greim, 222, F. S. Riley, 400, A. A. Ames, 761, E. F. Arnaud, 985, J. C. Ardoin, M. B. Bodger, P. R. Huitt.

Twenty-Year: Dept. 144, J. N. Trail, 250, R. P. Elsner, A. D. Garner, A. B. Jerke, 507, V. M. Jorgensen, 511, R. M. Cash, 524, G. M. Puntar, 756, E. R. Perry, 962, B. L. Smith, 989, E. A. Calvin, G. J. DeLong.

Fifteen-Year: Dept. 042, T. E. Funaro, 044, I. Jordan, 046, S. K. Eudy, 058, P. D. Weaver, 101, A. C. Justus, 131, J. H. Beasley, W. A. Matt, 142, A. G. MacKay, H. R. Simons, 193, J. S. Adamson, 204, L. H. Nelson, 221, E. N. Dunn, 223, V. M. Heckel, 250, A. J. Keen, 460, N. D. Heath, 584, R. E. Tatro, 591, E. F. Godenschwager, 595, D. H. Jirauch, 731, J. H. Akers, 756, R. B. Hayes, 810, H. P. Warn, 840, N. H. Kern, T. S. Swenson, 952, C. Peters, 962, R. C. Hagley, 967, E. P. Donovan, 979, E. N. Coleman, Jr., L. E. Green, N. Ritchie, Jr., A. J. Traum, 988, J. S. Gacho, 989, C. J. Banks.

ELECTRO DYNAMIC

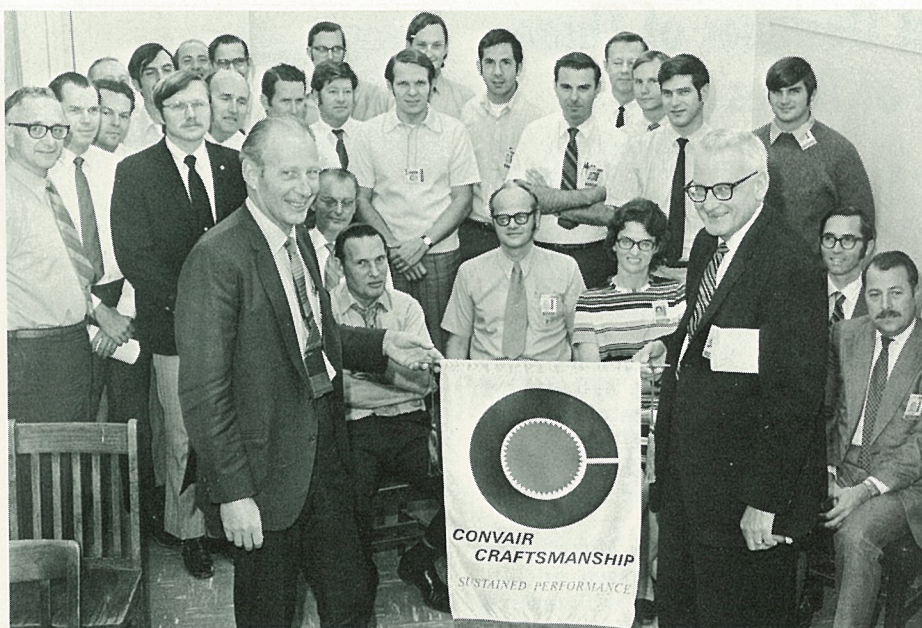
Thirty-Year: Dept. 426, B. J. Yoakum.

Twenty-Five-Year: Dept. 109, H. J. Brodersen.

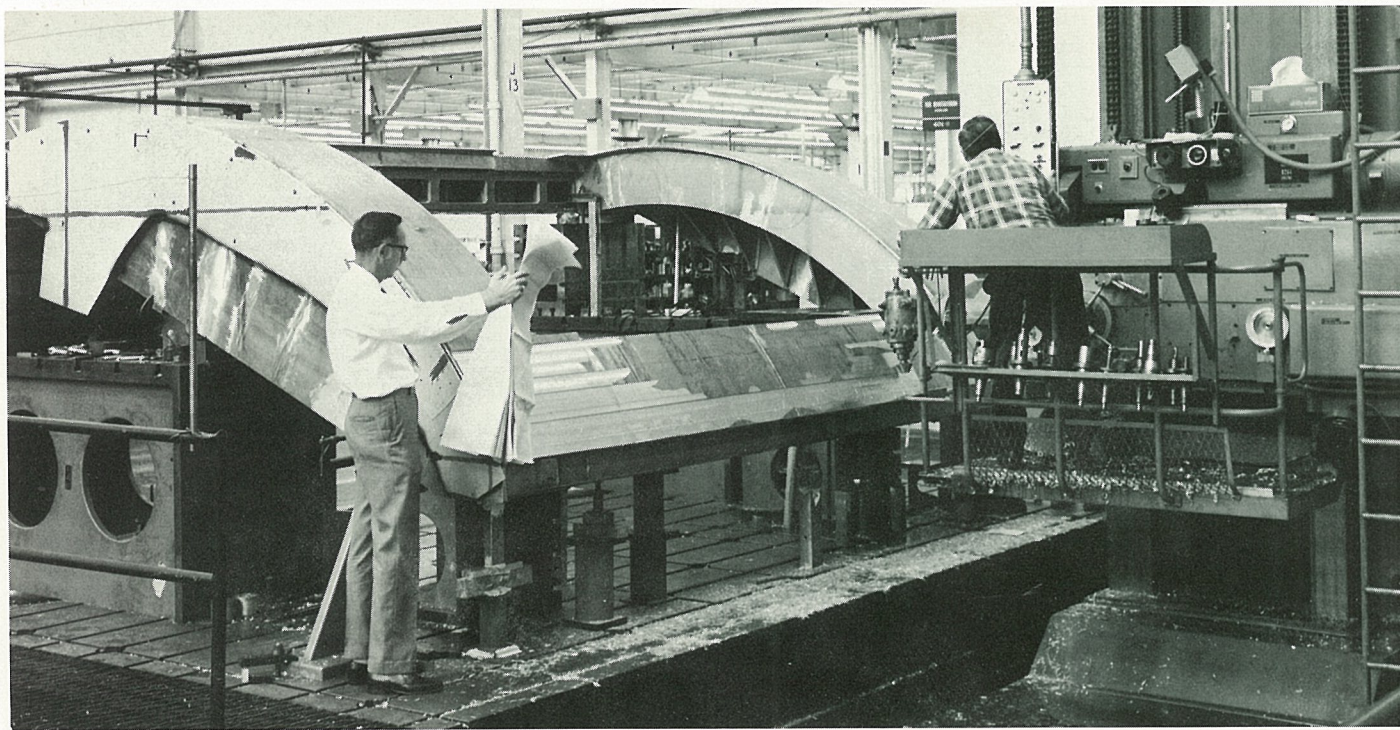
Twenty-Year: Dept. 422, D. A. Bettinger.

Fifteen-Year: Dept. 108, G. O. Perkins, 391, J.

E. Lundgren, 421, W. C. Becker, 422, R. F. Renteria, 444, Evelyn Brown, 447, B. A. Burch, M. C. Mulickm, G. A. Rivers, 449, Essie Mae Arnold, 636, H. C. Watton, 712, V. R. Schillo, 922, G. E. Duplissey, N. L. Pendergrass, 925, W. C. Pauls.



ENGINEERING EXCELLENCE—Thermodynamics group (584-0) received Convair Aerospace-SD research and engineering department's Craftsmanship banner for third quarter in competition with 52 other functions. John Wild, right foreground, director of engineering technologies, presents award to Frank A. Stevenson, chief of thermodynamics.



FREIGHTER TOOL—R. J. Came, left, Convair Aerospace-SD tooling engineer, checks first DC-10 Convertible Freighter major master gage for conformance to tool

design drawing as George E. Nicoll, milling machine operator, works at right. First DC-10-30 CF fuselage will be for use by Overseas National Airways.

DC-10 Convertible Freighter Tooling Fixture Completed

First major master tooling fixture for the DC-10 Convertible Freighter tri-jetliner (DC-10-30 CF) has been completed by Convair Aerospace Division's San Diego operation.

The 6,500 lb. fixture or gage represents the aircraft fuselage structure and contour around the opening for a 10 by 12-foot door — the largest to be included in the Convertible Freighter.

Production tools will be built from the master and the master retained for future reference as needed to verify proper contour, hinge and latch mechanism locations, and the opening for the cargo door.

Robert J. Came, tool and manufacturing engineer established requirements for the big master tool. Another master tool will be developed to simulate the related cargo door.

Joe Penner, chief of tool project engineering, said more than 45,000 tools have been developed by production engineering personnel for the DC-10 fuselage program and about 5,000 more will be required for the Convertible Freighter.

The first DC-10-30 CF fuselage is scheduled for delivery by Convair Aerospace-SD to McDonnell Douglas next July and will be for use by Overseas National Airways.

American Airlines inaugurated first commercial service with the wide-bodied DC-10 on Aug. 5 between Los Angeles and Chicago.

Spherical Tanks Will Contain 'Super Cold' LNG

(This is the last in a three-part series on LNG prepared by Quincy Shipbuilding Division)

To the eye, an LNG ship looks like a big tanker with spherical tanks protruding above the main deck. But her tanks are filled with a liquid which is at minus 260°, and if any of that liquid reached the steel hull of the ship through a leak, it would make the steel as brittle as glass.

So we don't have an ordinary tanker — we are dealing with cryogenics, the science of the super-cold. The cargo spheres and several of the main piping systems must be designed to keep the gas at its low temperature, and to handle it safely both in transit and during loading and unloading.

The early LNG carriers used ordinary steel tanks insulated with balsa wood — chosen because of its ability to retain LNG in case of a leak. It served as the "secondary barrier" which has been a prime factor in the design of LNG ships ever since. But experiments showed that aluminum and nickel alloy steel were far superior in retaining their properties under the temperatures of LNG.

Different designs for tanks, methods of support in the ship, and insulation were developed and are in use today. Quincy Shipbuilding Division made extensive studies of the various systems and chose the Moss Rosenberg system of large spherical tanks. This method was developed in Norway by the Kvaerner Group of companies, and Quincy is now the exclusive licensee in the United States.

It has several important advantages over other systems. First, the

spheres being of uniform shape lend themselves to automated manufacture. They can be built separately from the hull and installed at the shipyard's convenience. No secondary barrier is required, primarily because the spherical shape permits exacting stress analysis to be done with predictable results.

To support the tank, the Moss system calls for a cylindrical skirt plate attached to the spheres and to the ship structure. There is no need to refrigerate LNG because a layer of insulation is applied over the surface of the sphere. The ship then acts as a huge thermos. The quality of insulation (usually polyurethane foam) is most important since LNG heats up during the voyage, vaporizes, and has to be vented. This "boil-off" would be a loss of cargo if it were not for the fact the vaporized gas can be burned in the ships power plant as fuel.

Service on LNG ships so far has been very satisfactory. The largest ships in service are 71,500 cubic meters (equivalent to 450,000 barrels) running between Alaska and Japan. Three 125,000 c/m ships now on order constitute the largest ships planned for production.

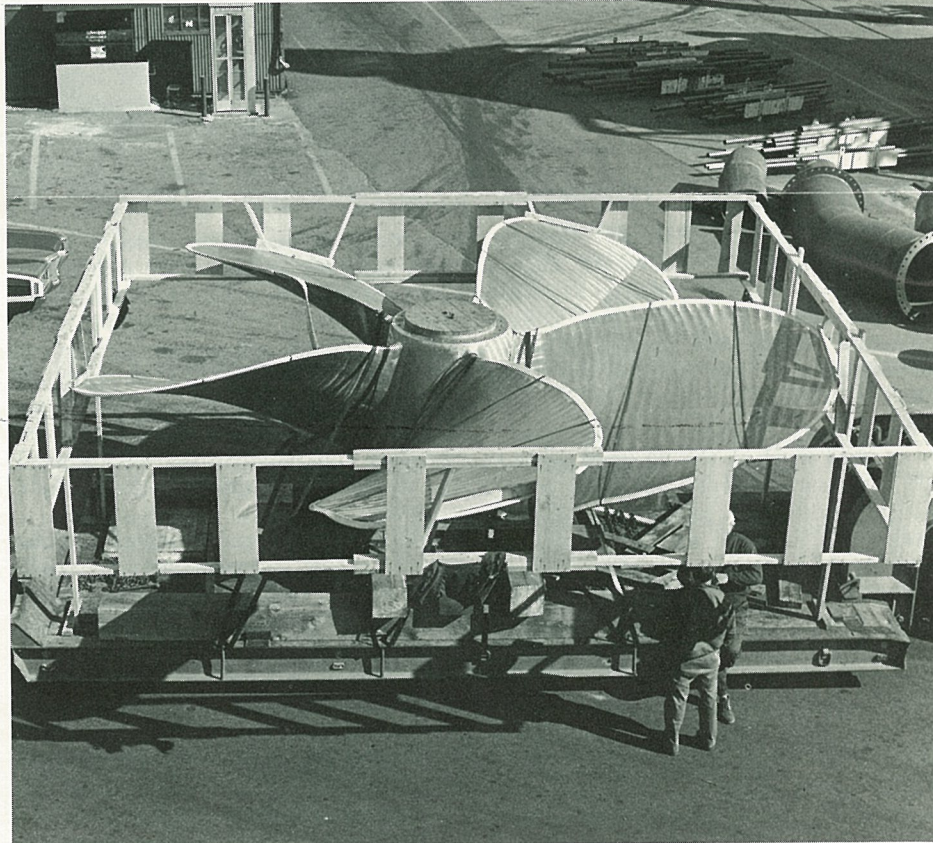
Quincy's 120,000 c/m ship rivals the largest ship built at Quincy, in size with a length of 924 ft., beam of 141.5 ft. and a deadweight of 61,000 long tons.

The General Dynamics LNG ship has been designed for maximum standardization of material, production process and flow. Unique methods have been developed for manufacturing the aluminum spheres and a mechanized process line will produce

flat panels making up the major portion of the hull structure.

It would be possible to deliver our first ship in late 1973 and attain a rate of five ships per year by 1975.

Quincy is in a most favorable position to take advantage of the energy demand in the U.S. calling for large imports of LNG in new complex ships which the remainder of the world shipbuilding market cannot supply within the time requirement.



BIG DRIVER—Propeller for the second Lykes Seabee, "Almeria Lykes," was delivered to Quincy in October. Like the propeller for its sister ship, "Doctor Lykes," it weighs 45 tons and has a diameter of 23 ft.

Kids Can't Wait

Talented Pomona Artist Designer of Three Floats for 'Tournament of Roses' Parade

Carrie Lynn, 7, and Trent Allen, 6, can't wait for New Year's Day and the annual Tournament of Roses parade at Pasadena. They'll have front row seats to see the parade which will include three floats designed by "Daddy."

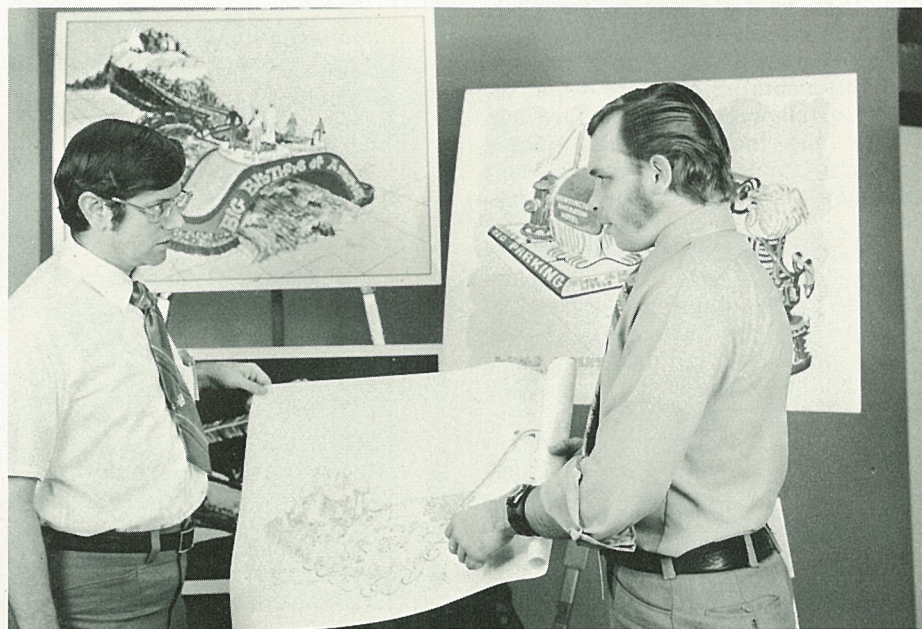
Daddy is Robert Thomas Mackie, a General Dynamics artist employed at Electro Dynamic Division's Pomona operation, and his designs are being used for the City of Torrence, Big Brothers of America, and Huntington-Sheraton Hotel floats.

Last April Mackie was contacted by C. E. Bent and Sons of Pasadena, a firm bidding to construct floats. Working in his spare time, Mackie submitted approximately 50 different designs. In addition to the three accepted, his designs were in running for City of San Diego and Santa Barbara floats.

Not only will there be front row seats at the parade for his family, but Mackie will have tickets to the Rose Bowl football game and will attend the Participants' Banquet in mid-December as well as the Queen's Ball at Christmas.

Mackie had no previous experience in float design. Prior to joining General Dynamics at Pomona in January, 1969, Mackie was a police officer for the Wayne County Sheriff's Patrol at Westland, Mich., and worked at the same time at the Prucher Art Studio in Detroit.

For the past two years Mackie has been taking evening classes at Mt. San Antonio College and will receive an Associate of Arts degree next January. He plans to continue his formal schooling by attending the Art Center of Design in Los Angeles where he will work toward a bachelor of science degree in conceptual design.



FLOAT DESIGNER—Bob Mackie, right, General Dynamics artist at Pomona operation, submitted winning designs for three floats that will be seen in next Tournament of Roses Parade. Assisting in preparation of finished drawings is another General Dynamics artist, Ron Van Paris, left.

To fellow employees:

For all of us, Christmas is the time of year when we count our blessings, realize anew the joy of being with family and friends and look forward hopefully to a new and even better year.

This is especially true this holiday season. Throughout the world there is the real hope that "peace on earth" may become a reality.

This past year has been a challenging one for all of us at General Dynamics. However, on balance, we believe it has been a constructive one and much progress has been made.

In the years ahead our company will have many opportunities for growth. All of us can help in the realization of these oppor-

tunities by working closely together, by helping each other to do a better job—simply by sharing our own gifts with others for the betterment of all.

May you and your family enjoy the pleasures of Christmas. It is our fondest wish that you have a joyful holiday season.

D.S. Lewis

David S. Lewis
Chairman

Hilliard W. Paige

Hilliard W. Paige
President

General Dynamics World

Vol. 1, No. 9

GENERAL DYNAMICS CORPORATION — SAN DIEGO

14178

December 20, 1971

Additional Funding for Standard Missiles Received by Pomona

General Dynamics Pomona operation has received funding of \$19.5 million for continued production of Standard Missiles for the U.S. Navy.

The \$19.5 million funding is for fiscal year '72 and part of a six-year production contract awarded by the Naval Ordnance System Command to General Dynamics early in 1967.

Replacement

Standard Missile is a replacement for the Terrier and Tartar missiles now in service and deployed on more than 70 ships of the U.S. Navy and a number of ships of several other nations. The missile was developed for both surface-to-air and surface-to-surface applications.

There are two versions of Standard Missile: extended range used on destroyer leader class of ships and on cruisers, and medium range for use on lighter ships such as destroyers and destroyer escorts.

Crown Re-Elected to Trans World Board

Lester Crown, president and chief executive of Material Service Corp., a subsidiary of General Dynamics, was re-elected to the board of Trans World Airlines. The Civil Aeronautics Board approved his continued membership.

A TWA board member since 1967, Crown declined to stand for re-election at the annual meeting pending a CAB decision on whether his association with GD amounted to a conflict of interest with his membership on the TWA board.

Health Center Team Sampling SD Fumes

A two-man team from the Corporate Bioenvironmental Health Center in Fort Worth is now sampling emissions from stacks at Convair facilities in San Diego.

Jim McKarns, bioenvironmental specialist, and W. R. Miller, health physicist, are sampling emissions of fumes, vapors, mists and particulates from all stacks to make sure the plant is in compliance with air-pollution regulations.

EB Gets Conversion Contract for 'Carver'

A contract for overhaul and conversion of the fleet ballistic missile submarine *George Washington Carver* has been awarded to General Dynamic's Electric Boat Division by the Navy.

The work will include preparation for overhaul, refueling, alterations, repairs and conversion of the *Polaris* submarine to accommodate the advanced Poseidon missile.



WELL PACKAGED—Generously lending their talents to "operation gift wrap," Sandy Cook, left, and Marsha Hubbard of General Dynamics Fort Worth operation, give the bright touch to Christmas packages for the holiday.

'WABASH' COMMISSIONED INTO NAVY AT BOSTON NAVAL YARD CEREMONIES

USS Wabash (AOR-5), newest ship of General Dynamic's Quincy Shipbuilding Division, was commissioned in ceremonies at Boston Naval Shipyard Nov. 20.

Congressman John T. Myers (R-Ind.) was principal speaker at the event. Assistant General Manager H. T. Verano was official Quincy Shipbuilding representative, and a large number of shipbuilders also were present as guests.

The commissioning directive was read by Rear Adm. Joseph C. Wylie, USN, Commandant, First Naval District, who turned the ship over to the command of Capt. Robert P. Chrisler, USN.

In his remarks, Rep. Myers said the *Wabash* commissioning conveys a message: "With the commissioning, we are telling friends and foe alike that we intend to stay a great nation, a strong nation; and that we are prepared, if need be, to protect our rights and interests."

"History records," Myers said, "that

the U.S. did not become a significant factor in world history until she became a great maritime power. For many years, we chose to marry ourselves to the British fleet. But in today's world, there is no British man of war—there is no Navy on which we can rely for our defense except our own."

Myers expressed alarm over the current expansion of the Soviet fleet. "If the U.S. continues to reduce its Naval force and the Soviet Union continues to increase," he warned, "it is inevitable that the day will come when, despite our technological advantage, the result will go against the U.S. and the free world."

(Continued on Page 2, Col. 1)

Adm. Land, Former GD Director, Dies

Retired VAdm. Emory S. Land, a former member of the General Dynamics board of directors, died last month after a short illness. He was 93.

Land, who spearheaded the rejuvenation of the American merchant fleet before and during World War II, was an original member of the U. S. Maritime Commission and became its second chairman.

He became a director of General Dynamics in 1949 and was a consultant to the corporation at the time of his death.

'Archerfish' in Fleet After Commissioning At New London Base

USS Archerfish, the Navy's 95th nuclear submarine, was commissioned Dec. 17 in a ceremony at the New London Submarine Base.

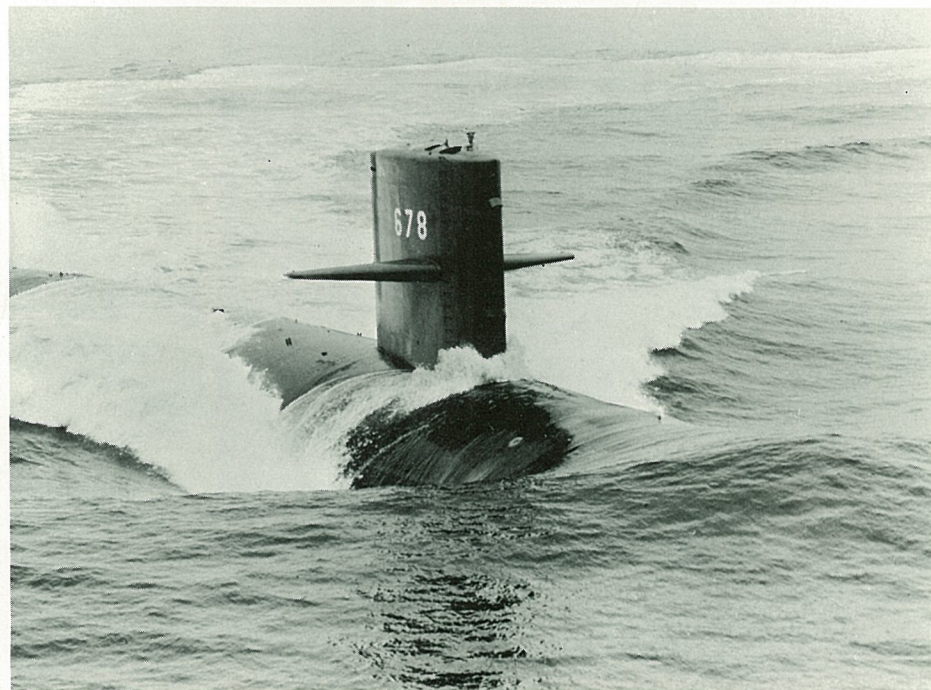
John W. Warner, Undersecretary of the Navy, was principal speaker at the commissioning, a role which he also filled at the sub's launching last Jan. 16. His daughter Mary, who christened *Archerfish*, and was at age 12 the youngest sponsor of a nuclear submarine, attended the ceremony.

Undersecretary Warner was introduced by VAdm. Eugene P. Wilkinson, Commander Submarine Force, U.S. Atlantic Fleet, following assumption of command by Cdr. Ralph G. Bird of Dearborn, Mich. The commissioning directive was read by RAdm. J. Nevin Shaffer, Commandant Third Naval District, who was introduced by Capt. Albert E. Rose, Jr., supervisor of shipbuilding, conversion and repair, Groton. Joseph D. Pierce, vice president of General Dynamics and general manager of Electric Boat Division, delivered *Archerfish* on behalf of the company.

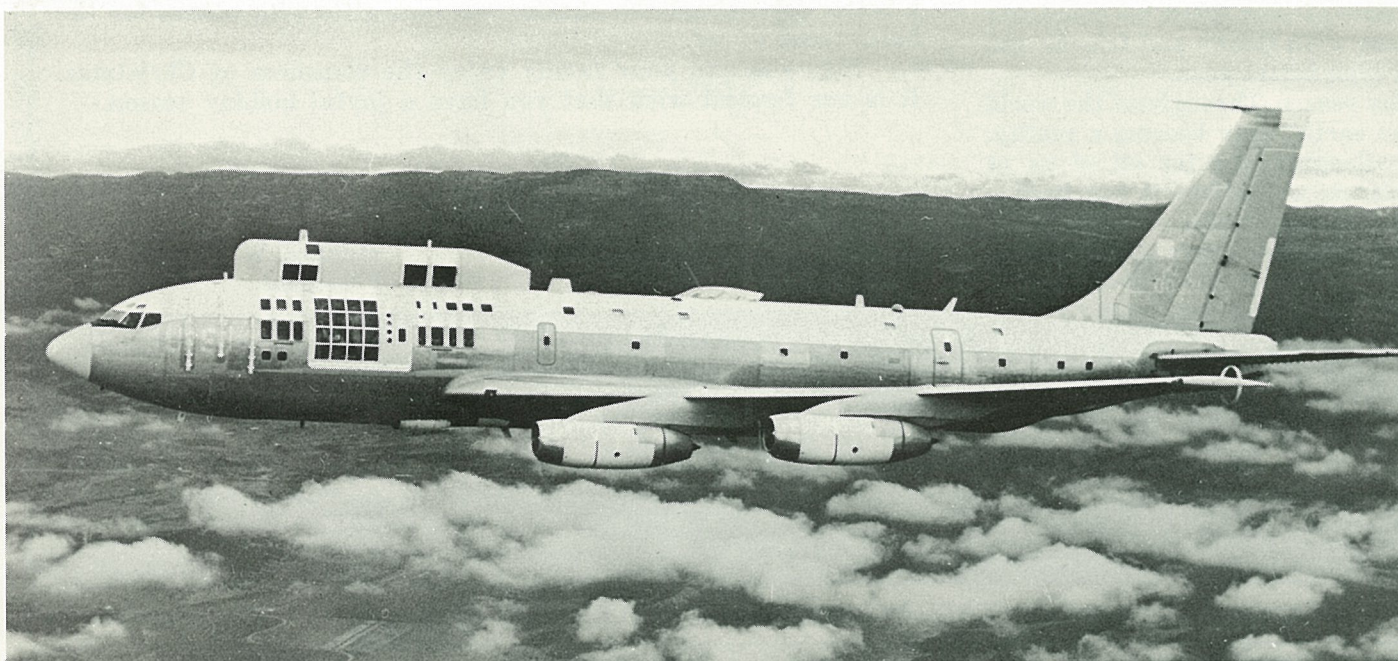
The invocation and benediction for the commissioning were pronounced by Rev. Ray N. Bird, brother of the new sub's commanding officer. Music was by the Submarine Base Band, directed by Gaylord R. Poole.

Named for a fish capable of shooting small drops of water to knock down insects, *Archerfish* is the Navy's second ship to bear the name. The first, a fleet submarine of World War II, earned two presidential unit citations and seven battle stars for operations in the Pacific. Under Cdr. J. F. Enright in November, 1944, she sank the 59,000-ton Japanese aircraft carrier *Shinano*, largest vessel ever sunk by a submarine.

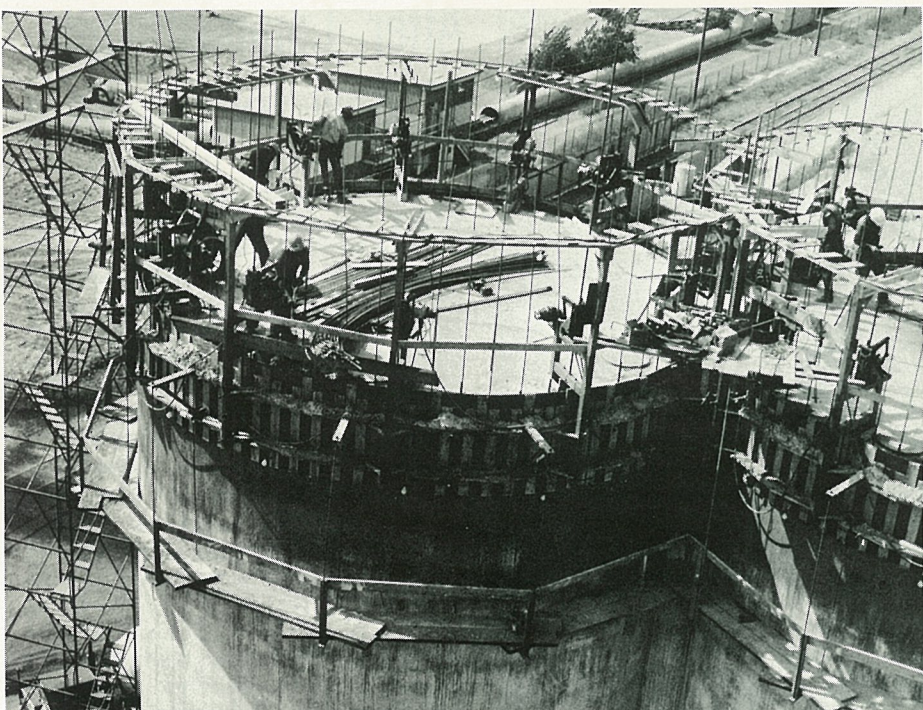
The new *Archerfish*, a *Sturgeon*-class fast attack sub, began her sea trials Sept. 12; she is manned by 12 officers and 95 enlisted men.



UNDER WAY — 'USS Archerfish' churns through Long Island Sound during successful sea trials. New nuclear attack sub was commissioned December 17.



FLYING LAB—NC-135A, equipped with sophisticated optical and avionics equipment, is used by Atomic Energy Commission as "flying research laboratory." Fort Worth operation converted three C-135s to this configuration.



LIME SILO—Concrete silos (80-ft. high) are under construction at Marblehead Lime's Buffington, Ind. plant as part of company expansion program. Silos are slated to be used for storage of burned lime for U.S. Steel.

'Wabash' Commissioned . . .

(Continued from Page 1)

Myers called for strong support of the Navy's budget requests over the next few years. "Our vital interests require a capability to control and use the seas to hold together the maritime alliance of which we are a part," he said. "Peace does not simply occur; it must be waged as surely as we wage war."

Indiana Congressman and Mrs. William G. Bray were also among the guests at the commissioning. Mrs. Bray christened *Wabash* at Quincy Shipbuilding Division on Feb. 6, 1971, and Rep. Bray delivered the christening address.

Wabash, the fifth replenishment oiler built by General Dynamics, is now in the latter stages of outfitting at the Boston Naval Shipyard. In

January the ship and her 371-man crew will proceed to Long Beach, Calif., for the beginning of service as a unit of the Pacific Fleet's Service Squadron One.



GRASSHOPPER TESTS — Left, terradynamic field test team prepares for impact and penetration experiment; Grasshopper test item, right, is recovered. Tests obtain penetration information in soils of different hardness.

Marblehead in Midst Of Major Expansion

Marblehead Lime's Buffington, Indiana, plant is beginning its second major expansion since 1966. The construction will make it one of the world's largest, and most modern, lime producing plants.

Marblehead Lime is a member company of the General Dynamics Material Service group.

The \$12 million project involves building two new kilns, increasing the plant's capacity by 320,000 tons per year. The increase will put Buffington's production over the 800,000 tons-per-year mark.

Buffington manufactures high calcium lime primarily for U. S. Steel. In the manufacture of steel, lime serves as a flux to remove impurities from the molten metal. The raw limestone is brought to the plant by ship from U. S. Steel's quarries in northern Michigan.

The most modern pollution-control fiberglass bag dust collectors will be incorporated in the new construction. The bag dust collector system removes particulate matter from the kiln's exhaust, prior to entry into the atmosphere. It operates on the same principle as a vacuum cleaner and removes all visible particulates, making it over 99% efficient.

Mobile Lab Grasshopper's Test Bed

Terradynamic testing—to determine how well a projectile "flies" through the ground—is one of the major efforts in preliminary phases of the Grasshopper Antivehicle Mine Program being conducted by General Dynamics for the U.S. Air Force.

Engineers at Pomona operation have devised a unique mobile laboratory employing a modified M-113 armored personnel carrier. Projectiles are "flown" through the ground using

a piston type accelerator which provides controllable impact velocities and precise angles of attack and flight path angles.

The mobile laboratory makes possible documentation of each test through outputs of tri-axial accelerometers located in the projectiles and by highspeed motion pictures.

Ability of the M-113 to move about in rugged terrain permits the mobile laboratory to obtain data on projectile

AEC Analyzing Blast Effects at Amchitka With 'Flying Labs'

Two NC-135A "flying scientific laboratories" built by Fort Worth operation participated in the recent nuclear explosion below the surface of Amchitka Island.

The two aircraft, specially equipped with sophisticated sensing devices, flew directly over the blast area immediately after detonation to analyze blast effects on the atmosphere.

Fort Worth converted three C-135s to the NC-135A configuration several years ago for Air Force Logistics Command. The aircraft were turned over to the Atomic Energy Commission for use in aerial research projects.

AEC has used the three aircraft to investigate effects of the aurora australis and aurora borealis (southern and northern lights); the solar eclipse; and a variety of other natural phenomena.

Testbed

The aircraft are also being used at Kirtland AFB, N.M., as a flying testbed for various navigation systems.

Fort Worth modified the C-135s extensively, literally cramming the huge cargo aircraft with ultra-sophisticated optical and avionics equipment. A large protuberance atop the aircraft gives the NC-135A a "hunch back" appearance. The aircraft were given a further distinctive appearance by addition of special windows, doors and openings for various optical equipment.

One special feature of the aircraft is a "flying antenna," a 15-foot long boom which can be reeled in and out of the aircraft to measure magnetic impulses in the atmosphere.

Special projects at Fort Worth has a task force of engineers and technicians at Kirtland assisting in maintenance of the NC-135As. The effort is coordinated by W. M. Johnson.

"These aircraft have performed well during the past seven years," said Vinko Dolson, special projects program director, "We've received a number of commendations from AEC for our part in converting the aircraft and keeping them in flying condition."

reactions in a variety of previously undisturbed soils. Currently these tests are being conducted in the U.S. Army Corps of Engineers' Prado Dam area, south of the Pomona plant. Other tests are scheduled later this year for the Deadman Lake area at Twentynine Palms Marine Corps Base.

The Grasshopper target activated mine, air-delivered by fighter aircraft, will employ advanced sensor technology and specialized warhead capability.

Terradynamic investigations at the Pomona operation date back to 1964. A terradynamic laboratory was constructed in 1965. This facility has been employed for various impact and penetration research and development tasks including advancement of the new and emerging soil dynamics technology.

The 20-month Grasshopper Program also involves development and testing of fuze, warhead and flight vehicle, with USAF demonstrations culminating each major event.

General Dynamics World

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Bill Levering—Editor

Jack Isabel—Associate Editor

FW Expertise in Forefront Of Aerospace Technology

This is the first in a series of articles highlighting the activities, the background, the potential and the people of the major divisions and operations of General Dynamics Corporation.

Fort Worth operation-built products have been at the virtual forefront of aviation technology since 1941.

Today, the company builds the F-111, first operational swing-wing fighter and easily the most versatile aircraft in Air Force inventory.

Yesterday, it turned out such stalwarts as the B-24 (workhorse of World War II), B-36 (first intercontinental bomber), and B-58 (first supersonic bomber).

Tomorrow, Fort Worth figures to remain a strong competitor because of its continuing quest for expertise in such "futuristic" areas as supercritical airfoil design and advanced composites.

Engineers are working on two supercritical design projects. One is a feasibility study for commercial aircraft of the 1975-85 era; the other is a contract to build and flight-test a supercritical wing on an F-111.

Fort Worth is also the industry pace-setter in using advanced composites, probably the most promising aircraft material of the future. Only last month, an Air Force F-111 was equipped with boron epoxy composite horizontal stabilizers—largest such component ever flown on an operational aircraft.

For the foreseeable future, however, Fort Worth will continue to produce—and improve—the F-111. It will continue to bid on promising new

prototype programs, such as the lightweight fighter. And it will continue to exploit the considerable capability of its special projects and electronics groups.

The Special Projects group is a highly skilled team of about 1,000, whose talents encompass all the aerospace disciplines. They built the RB-57F aircraft now used by the Air Weather Service. And they have carried out highly specialized modification programs on the C-97, F-102, B-36, KC-135, B-58 and C-131, to name a few.

Thanks to a capability it has built up steadily over the past 14 years, Fort Worth is now heavily engaged in designing and producing electronic

systems. Its products range from basic micro-electronic components to complete operations systems.

Present efforts include systems and equipment for electronic warfare simulation and training, air-traffic control, contract research and development on optics, and radar cross section, among others.

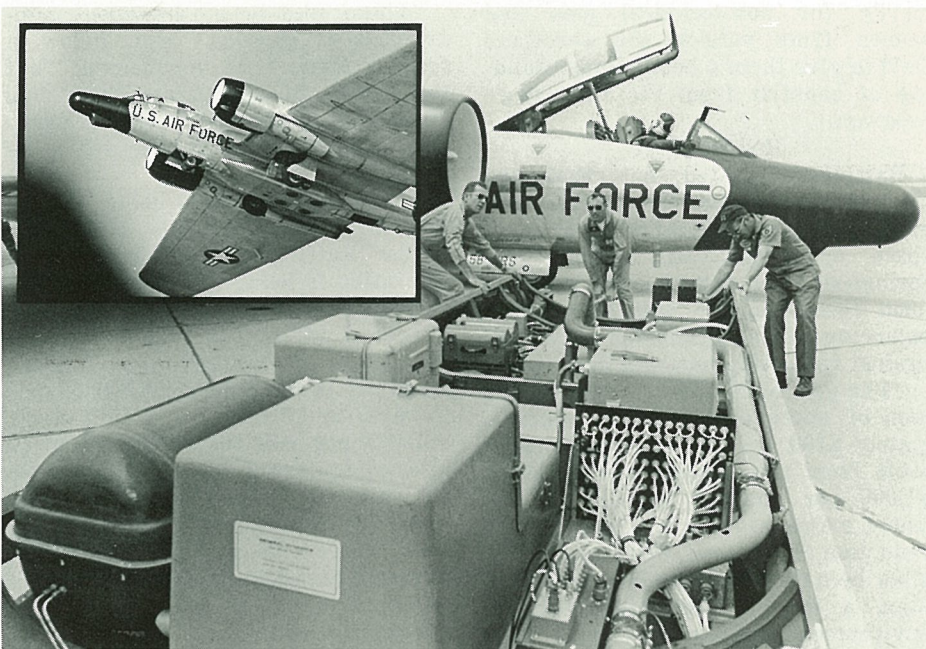
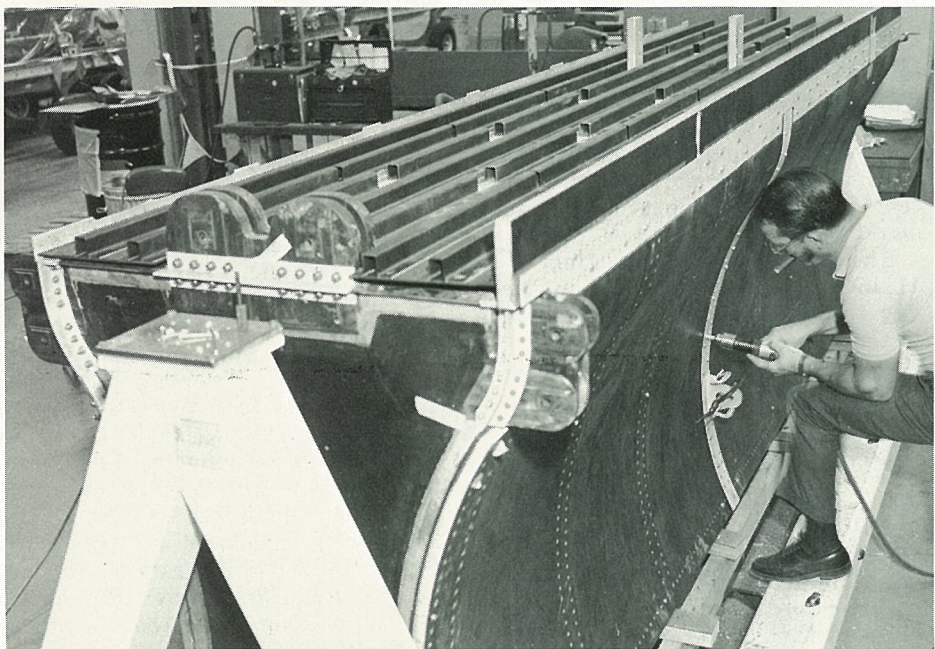
During the 1970s, Fort Worth plans to produce, and perhaps refine the F-111, which is now reaching a peak of performance—and acceptance.

At the same time, the company will continue to use its vast resources and know-how to produce appropriate deterrent strength for the unpredictable days ahead.



TEXAS SIZE — Huge, modernistic Fort Worth operation facility is spread out over 607-acre reservation. Aerial view shows 4,666-foot long factory building and 600,000-square-foot engineering and office building.

Flight line facilities are at left. Above, left, Frank W. Davis, Convair Aerospace Division president, inspects assembly line with R. E. Adams, right, vice president and general manager of Convair's Fort Worth operation.



BUILDING KNOW-HOW—Skilled craftsmen have built some of the largest and most intricate composite parts in the industry. This 14-ft. long boron and graphite epoxy composite is the largest such part built to date.

SPECIAL PROJECT — Huge RB-57F instrument pallet — designed for quick attachment and removal — is typical of highly specialized work done by Special Projects. Inset shows Air Weather Service craft in flight.

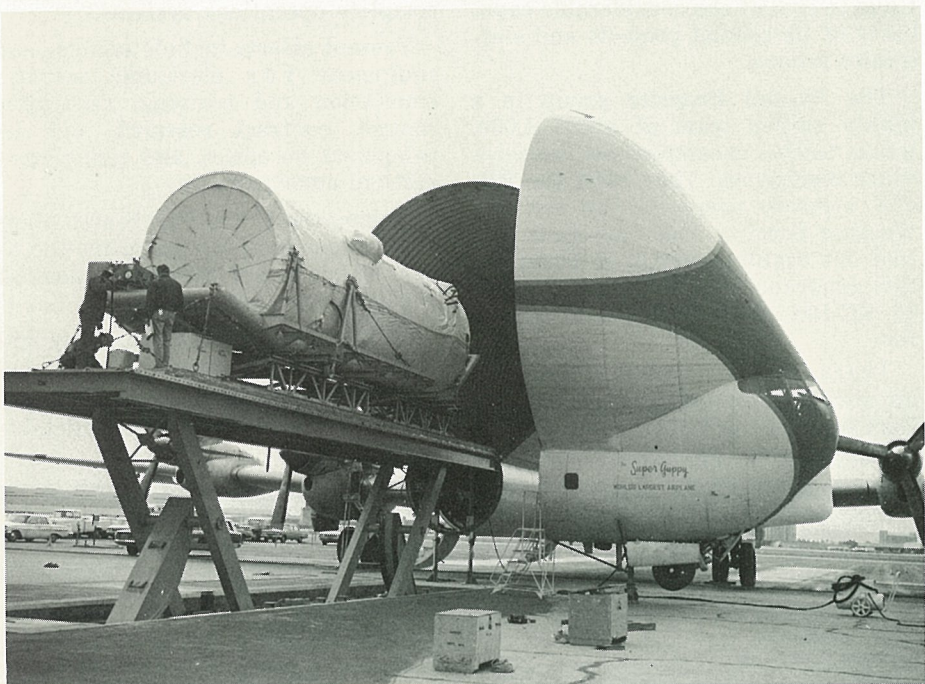


FLIGHT LINE — F-111s are now deployed with four Tactical Air Command units. Above, F-111s are readied for sorties by men of 474th Tactical

Fighter Wing at Nellis AFB, Nev. Deliveries of the aircraft, first operational swing-wing fighter in Air Force inventory, are continuing.

PRECISION DRAFTING — Lois Hall prepares master art work on special mylar film. Using precision drafting machine, lines can be cut to 1/2,000th of an inch.

Convair Aerospace · Electro Dynamic San Diego



CENTAUR SENDOFF—Centaur high-energy upper-stage vehicle for use in Atlas-Centaur 27 flight to start Pioneer-F spacecraft on journey to Jupiter is loaded aboard Super Guppy aircraft in San Diego for flight to Cape Kennedy. Pioneer-F spacecraft will pave way for later Grand Tour missions.

Space Shuttle's Role Described By Rattinger at 'Space Congress'

Space Shuttle's role as the keystone of future space activities was described by Ivan Rattinger, Space Shuttle deputy program director for Convair Aerospace-SD, Nov. 16 at the first International Congress on "Space for Mankind's Benefit" in Huntsville, Ala.

The "Space Congress" was sponsored by the Huntsville Association of Technical Societies and was designed primarily for non-technical men and women from outside the aerospace field to give them a better understanding of benefits from the U.S. space program.

Reduce Cost

Rattinger pointed out that the planned Space Shuttle system will greatly reduce the cost of near-earth space operations, will supply the springboard for future space development activities, and will represent a balancing of the quest for adventure against competing national priorities.

"The goal of NASA is to reduce the cost of space operations to approximately \$100 per pound in near-earth orbit from the present cost of about \$1,000 per pound," he said. "Additional major savings will result from reduction in payload costs made possible because of less sophisticated design, a more benign transportation environment, and a great improvement in our ability to retrieve, refurbish,

and repair satellites of various military, scientific, and commercial applications."

Rattinger called the shuttle a "necessary prerequisite" to the proposed space tug, space station, and Research and Applications Module since each would be dependent on the shuttle for economical transport to orbit, support while in orbit, and return to earth.

"There need be no dependent commitment to develop these follow-on space systems," he commented, "but the ability to incorporate them into an orderly development will be available as long as the shuttle vehicle is available."

The Space Shuttle is being planned for use throughout the 1980s and 1990s. Rattinger said careful consideration is being given to designing it large enough so that it will not be "under-sized" by the time it becomes operational. Present plans call for the cargo bay in the Shuttle orbiter vehicle to be 15 by 60 feet.

Rattinger said the shuttle program also is significant because it can help the United States maintain technological superiority. "This requires that basic research be sustained across a broad front and that applied research be focused upon selected areas," he said.

Areas of emphasis crucial to the maintenance of technological leadership were listed as:

Support of major and technically challenging development programs of national scope that form the "cutting edge" for the advancement of technological capability.

Support of multi-disciplinary management, scientific, engineering, and production teams which integrate government, university, and industrial resources and which organize and motivate them to achieve a specific goal.

"New blood" in the form of a continuing supply of and fruitful employment of young scientists and engineers.

Stimulation of the aerospace industry, a crucial area of our national economy having a high impact on consumer spending and U.S. balance of trade problems.

SALVAGE SCHEDULE

Next employes sales day at the materials salvage yard, Lindbergh Field plant, will be Saturday, Jan. 8. Hours are from 8 a.m. until noon. Entrance is by badge.

CONVAIR-SD AWARDED MULTI-YEAR NASA CENTAUR SERVICES CONTRACT

NASA has awarded GD's Convair Aerospace Division a \$24,770,500 cost plus award-fee contract for management and engineering support services for the Centaur launch vehicle program through Nov. 30, 1973.

The new contract is the first of its kind to cover a two-year period. Similar follow-on contracts have been awarded annually since 1965.

Convair Aerospace-SD will provide up to 1,010,000 direct manhours for management and engineering support tasks under the basic contract. Options also included for an additional 40,000 manhours may be exercised by the government prior to Oct. 1, 1973, at an estimated additional cost of \$866,800.

Ron Stoneburner, contract administrator for Convair Aerospace-SD, said the contract will provide engineering

support for one Orbiting Astronomical Observatory (OAO) launch, seven Intelsat commercial communications satellite launches, the Pioneer-F launch for Jupiter fly-by, the Atlas-Centaur 34 Mercury-Venus spacecraft launch, and the Titan-Centaur Helios-A launch for study of the sun.

Also included as a major work task will be engineering to support future Viking missions in which spacecraft will make soft landings on the planet Mars.

"All required management and engineering services will be provided to assure successful mission accomplishment from concept through launch and post-flight analysis, including the integration of Centaur with spacecraft and booster vehicles," Stoneburner said.

Detailed direction on work to be performed within the scope of the contract will be defined by separate technical directions from the NASA Lewis Research Center, which has management responsibility for the Centaur program for NASA. Convair Aerospace-SD has responded to more than 825 such technical directions for its launch-vehicle programs during the past five years.

Kearny Mesa Safety Crib and Employees' Tool Store Relocated

Relocation of the Kearny Mesa plant safety crib and employees' tool store has been announced by D. D. Dimmitt, Convair Aerospace-SD chief of safety and fire.

The safety crib has been moved to Bldg. 6 adjacent to the transportation dispatcher's office. (This is the building that also houses the plant fire station, security office, and transportation section garage).

Safety glasses and safety shoes are sold and other safety items are sold or distributed without charge at the safety club. The crib is open from 8:15 to 11:30 a.m. and 12:30 to 5 p.m. Mondays and Wednesdays and from 6:30 to 11:30 a.m. and 12:30 to 3:30 p.m. Fridays. Ernie Cox is the attendant.

The employees' tool store, operated by Western Metals Supply Co., has been moved to Bldg. 31, between Bldgs. 5 and 33.

A wide selection of high-quality tools is available at about a 20 per cent discount and items not in stock may be ordered.

The tool store is open from 9 to 11:45 a.m. and 12:30 to 5 p.m. Monday through Friday. Wilma Parsons is the attendant.

YEAR-END HOLIDAYS

Convair Aerospace and Electro Dynamic employes in San Diego have two four-day weekends ahead for the holidays.

Except for necessary security and maintenance functions, plants will be closed Dec. 23 through Dec. 26 and Dec. 30 through Jan. 2 for Christmas and New Year's.

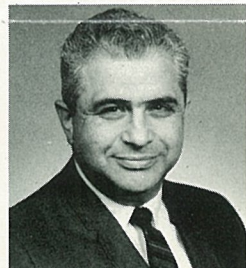
Zeenkov Appointed Operations Manager At Kearny Mesa Plant

Seymour Zeenkov has been appointed manager of operations for the Kearny Mesa plant of Convair Aerospace Division's San Diego operation. He reports to J. M. Adamson, director of operations.

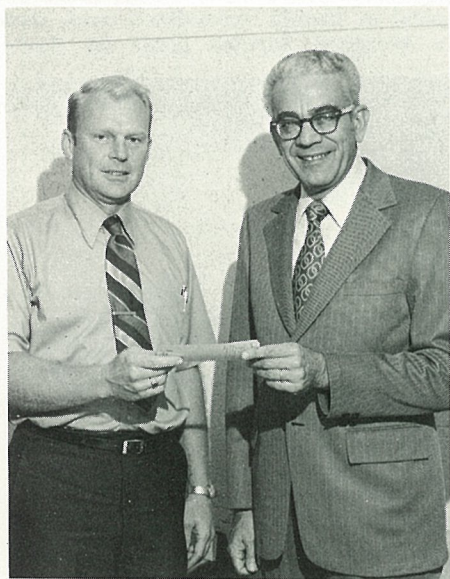
In his new assignment Zeenkov is responsible for operations, material, industrial engineering, and master scheduling activities at the Kearny Mesa plant. He also has surveillance over launch vehicle program support activities of the Electro Dynamic Division at Kearny Mesa.

Zeenkov had been serving as deputy program manager of the Centaur program. He joined Convair Aerospace as a senior flight test engineer in 1958 and previously had served as a project engineer on the Atlas, Centaur and Improved Centaur programs.

Before joining General Dynamics, Zeenkov was employed as a senior engineer for Vertol Aircraft Co. in Morton, Pa. He holds a degree in mechanical engineering from the University of Virginia and a master's degree in management sciences from USIU.



Seymour Zeenkov
Division at Kearny Mesa.



'BRIEF' CHECK—Harvey Jewett Jr., Convair Aerospace-SD Dept. 962-3 senior design engineer, receives \$25 NASA Tech Brief award check from K. E. Newton, right, vice president—launch vehicle programs. NASA has distributed 12,000 copies of a Tech Brief on a simple, shock-free, quick-release connector devised by Jewett.



COMMENDATION — Maj. Gary A. Leach, right, on duty in Education With Industry (EWI) program, is awarded Air Force Commendation Medal for accomplishments while assigned as B-57 crew member. Presenting award is Col. Charles F. Merz, commander of Defense Contract Services District-SD.

NASA-Lewis Team Visits Convair-SD for AC-29 Centaur Tests

A nine-man team from NASA's Lewis Research Center and three Comsat Corp. representatives were at Convair Aerospace Division's Kearny Mesa plant last month for running of successful composite tests on the Atlas-Centaur 29 high-energy Centaur vehicle.

The AC-29 Centaur will launch the fourth of the Intelsat IV commercial communications satellites in a mission managed by Comsat for the world-wide Intelsat consortium of nations.

It also is the last of 14 Centaur-D vehicles to be produced by Convair Aerospace-SD under the \$40 million NASA launch vehicle contract.

John Quitter was leader of the NASA-Lewis team present for the test. Comsat was represented by W. J. Keck, N. R. Lardy and S. B. Bennett.

Ed Lindgren, Centaur program office engineer, said the composite test was conducted to demonstrate that the Centaur vehicle's systems would function properly together under simulated flight conditions.

The vehicle later was to be mated with its interstage adapter and fairing systems in the Vertical Assembly Tower at the Kearny Mesa plant.

Key Posts Filled for New Convair Project

Some key personnel in the lightweight fighter prototype program have been announced by Frank W. Davis, Convair Aerospace Division president.

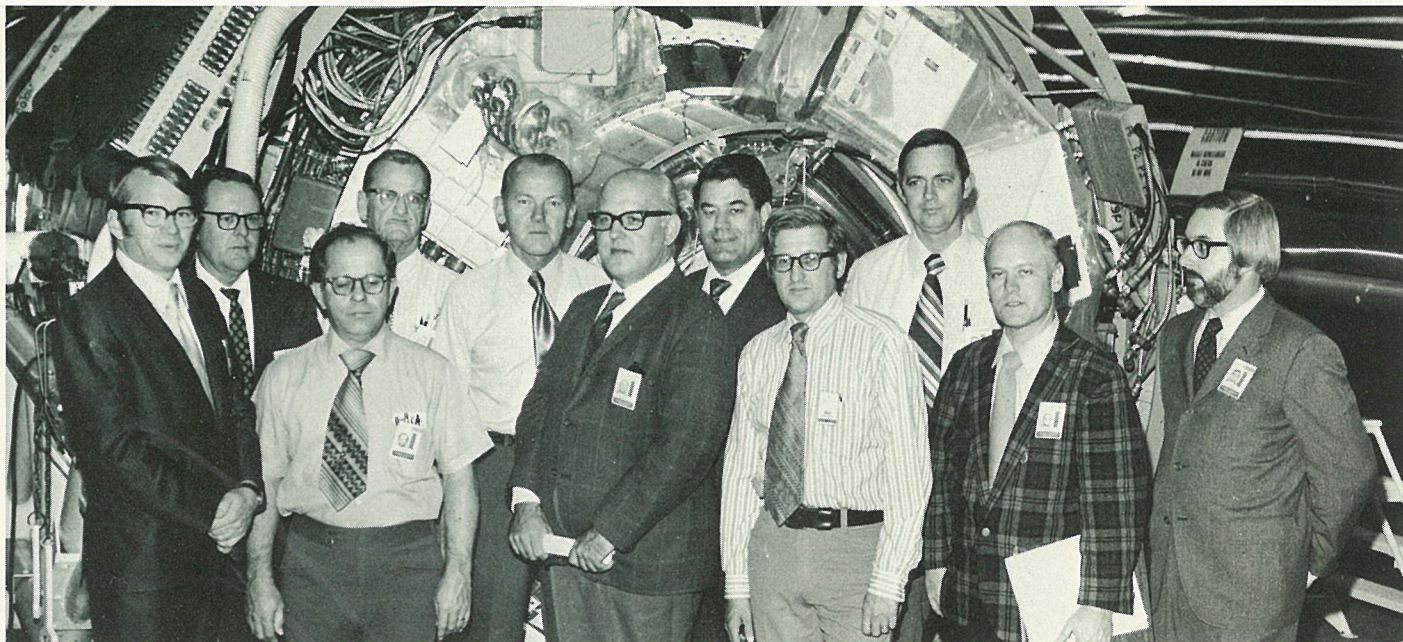
All will report to L. C. Josephs, recently named vice president-program director for the prototype program. They are:

W. C. Dietz, director of engineering; D. B. Scheideman, director of contracts, plans and program control; W. C. Malloy, manager of test and evaluation; D. O. Jordon, manager of manufacturing; and J. T. Dickenson, manager of procurement and GFAE.

Con-Trib Okays Over \$20,000 in Grants

Grants totaling \$22,145 for 13 community service organizations were approved by the Convair Employees' Con-Trib Club Committee in recent meetings.

Included was \$5,000 for Sheltered Workshops, \$4,600 for the Girls' Club of San Diego for repair and refurbishment of facilities, \$4,000 for the San Diego Speech and Hearing Clinic toward purchase of an operating microscope, \$2,000 for the St. Vincent dePaul Center for purchase of equipment, \$850 for the San Diego YMCA for purchase of equipment, \$530 for



TEST GROUP — Customer representatives and Convair Aerospace-SD personnel pause after successful composite test for Centaur vehicle to be used in Atlas-Centaur 29 Intelsat launch. Left, R. E. Jumont, NASA; W. J. Keck,

Comsat; G. G. Christ, Convair; John F. Berry, DCAS; Ed Lindgren, Convair; J. P. Quitter, NASA; N. W. Moll, NASA; R. A. Flage, NASA; Ken Odom, Convair; Jim Swaveley, NASA; and B. R. Foushee, also of Convair.

Technology Degrees Conferred on Student Group by Texas State Technical Institute

Fifty-two San Diego area General Dynamics personnel—38 from Convair Aerospace Division and 14 from Electro Dynamics Division—received Bachelor of Technology degrees from Texas State Technical Institute at a graduation banquet Dec. 10 in the Hotel del Coronado.

They were among 75 graduates who recently completed a year of intensive evening studies in industrial technology in two TSTI classes, one meeting at General Dynamics' Kearny Mesa plant and the other at the U.S. Naval Training Center.

Dr. Frank Dickey, executive director of the National Commission on Accrediting from Washington, D.C., was commencement speaker. The degrees were conferred by Dr. Roy W. Dugger, TSTI president from Waco, Tex.

Convair Aerospace-SD personnel receiving degrees included Richard J. Archibald, Glen A. Barker, Walter J. Borden, Joseph M. Bowers, William J. Bullock, Ernest E. Chavez, Hilbert J. Coffey, William L. Colahan, Jesse E.

Cook, Richard A. Droll, Charles P. Dunifer, Russell F. Fox, Robert F. Frederick, Leonard I. Fredrickson, Oliver L. Harris, John D. Hash Jr., James C. Higdon, and Remington R. Jackson.

Also Ralph N. King, J. Gary Kornmayer, William H. Lakin, Fred M. Lay, William G. Martin, Janice E. Mason, Larry D. Messacar, Robert W. Miller, Raymond F. Nelson, Elmer J. Penner, Jacquelyn J. Ridley, Albert R. Shaklee, Robert V. Shields, Kathryn M. Solomon, Roy E. Sommers, Loyd C. Stuckey, James D. Tate, Charles E. Ulrey, Joseph L. Williamson, and Loren C. Wilson.

Electro Dynamic-SD degree recipients included Richard J. Blommer, Kenneth Erickson, Kenneth L. Giddings, William J. Hemmer, James H. Mason, Richard E. Moore, Richard H. Nicholson, Everett R. Peters Jr., Robert E. Pullen, William A. Reinman, May M. Trent, Ralph S. Vernor, William W. Wilmece, and Robert L. Williams.

David Chigos, TSTI vice president-development, said the graduates had been accepted for the special degree program based on a minimum of 10 years previous business experience, three years of transferable college credit or the equivalent, and scores on College Entrance Examination Board tests.

Courses included in the program were Organizational Development, Human Resources Administration, Managerial Accounting, Managerial Economics, Managerial Finance, International Relations, Industrial Ecology, Information Systems Management, Operations Research, and Social Responsibilities of Business.

Texas State Tech offered its first special baccalaureate degree program in San Diego in 1970 in conjunction with Convair Aerospace Division. The first group of 36 graduates flew to Waco, Texas, last December for their degrees.

For information on General Dynamics World contact Convair Aerospace San Diego Public Affairs Dept., ext 3322KM, or Electro Dynamic San Diego Public Affairs, ext. 3189KM.



TOE SAVER—Steel plate in safety boot saved a few toes for Gerard Eberle. While mowing home lawn, mower hung on small post then rolled over boot when he pulled it back.

SERVICE AWARDS

Service emblems due between Nov. 16 and Nov. 30, 1971.

CONVAIR

Thirty-Five-Year: Dept. 106, B. F. Ferguson; 202, W. H. Evans.

Thirty-Year: Dept. 001, W. L. Dueber, B. T. Robinson; 020, M. J. McCormick; 042, J. C. Rodriguez; 043, H. S. Boyd; 044, B. K. Gingery, R. J. Larson; 110, I. U. Eggert, Jr.; 170, J. E. McCann; 193, G. B. Steed; 221, J. R. Graves, Jr.; 400, C. B. Davis; 566, R. D. Chesler; 731, H. A. Ostlin.

Twenty-Five-Year: Dept. 015, L. E. Worden; 031, C. B. Burkhardt, C. H. Linn; 221, E. P. Lawson; 250, R. F. Bonner; 407, R. G. Metz; 460, J. Quince, Jr.; 512, J. E. Humphreys; 518, R. L. Plummer; 759, F. J. Mathis; 761, E. J. Kulczyk; 802, G. D. Sanders.

Twenty-Year: Dept. 019, H. L. Brand; 031, K. L. Pauley; 044, H. M. Romero; 130, C. U. Blanchard; 144, R. S. Campbell; 147, D. F. Rogers; 149, C. E. Wheary; 250, C. D. Fitzpatrick, A. Hal'cy, M. A. Long; 400, J. A. Drazkowski, J. J. Grimes, J. B. Murphy; 401, A. I. Saito; 545, D. E. Hays; 566, N. K. Polakowski; 759, J. A. Wiggins; 842, M. L. Burkhead; 860, J. E. Neff; 986, H. L. Doughty.

Fifteen-Year: Dept. 001, A. D. Manzano; 015, R. C. Tileston; 019, W. A. Wachtelborn; 043, B. E. O'Brien; 046, A. H. Flood; 058, V. O. Weese; 110, R. W. Frye; 146, R. A. Lindsay; 147, S. I. Beadle; 148, V. Moe; 149, W. S. Brown; 203, W. R. Bruce; 222, W. O. Bradley, L. Rieder; 250, M. R. Sandoval, J. R. Schleiger, E. P. Snook; 512, A. Fujimoto; 574, C. A. DeForge; 575, F. W. Wundrow; 754, M. A. Revetti; 833, E. Gonzales; 834, W. F. Cogan; 850, D. R. Butterfield; 962, G. A. Lindberg; 966, J. F. Conly; 967, M. Cornwall; 985, G. C. Bates.

ELECTRO DYNAMIC

Twenty-Five-Year: Dept. 426, D. J. MacDonald. **Twenty-Year:** Dept. 426, F. J. Sabatka; 523, Stella A. Stowers; 711, D. M. Dreyer.

Fifteen-Year: Dept. 445, Leona M. Lavigne; 447, M. C. Frazier; 448, O. W. Clark; 449, G. B. Jon-dall; 566, Audrey N. Sletnar; 711, J. D. Anderson, G. R. Lynn; 815, Joyce A. Gilliam, Marie M. Soto.

Recreation Notes

Bridge enthusiasts, from novice to life masters, are welcome to join in duplicate play at 7:30 p.m. each Friday in the CRA Clubhouse. Master point nights are held each month.

★ ★ ★

Bob Nicholas earned the Diver of the Year award with 75 points, followed by Jack Read and Loren Batchman, in the 1971 CRA Delta Divers competition. Winners of the team competition were Roy Rogel (captain), Hal Reeser, Russ Cicotte, Phil Swanson and Nicholas. Hardy members of the club will start the new year off

with the annual Polar Bear Dive, Jan. 1 at La Jolla Cove.

★ ★ ★

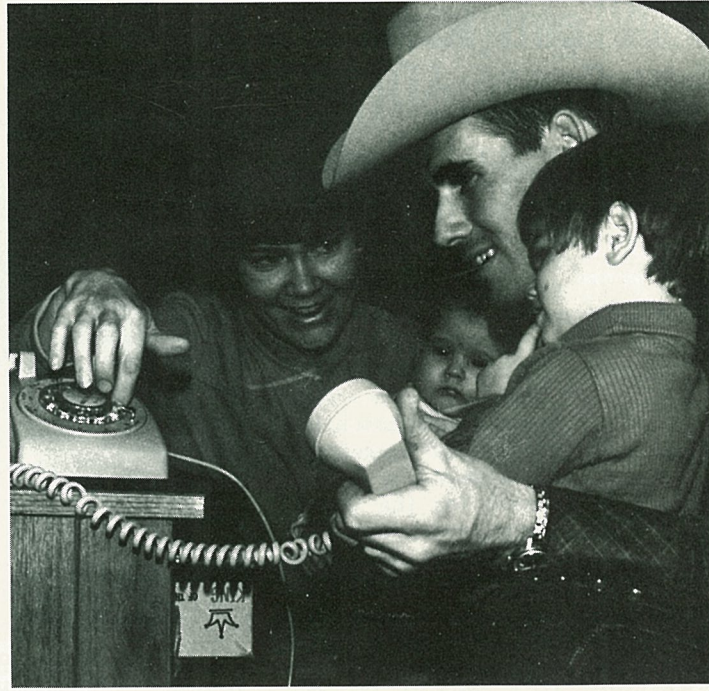
Members of the CRA Golf Club will wind up the 1971 season Dec. 23 at Singing Hills links. Tee-off is 8 a.m.

★ ★ ★

General Dynamics days at Sea World are scheduled Jan. 29-30. Sponsored by the Convair Management Assn., tickets are available from boosters and the CRA Clubhouse. Cost is \$2.75 for adults, \$1.75 for juniors and \$1 for children. Management Association's scholarship fund will receive 25 cents for each adult and junior admission.



FILM SAVING — Roni Kratz, engineering blueprint control clerk in Dept. 524-2, receives \$829.50 employee suggestion award check from J. F. Thompson, director of engineering administration and services. Under her award-winning suggestion, up to four pages of DC-10 engineering orders can be reproduced on one microfilm and stored on a single aperture card.



ON LINE — Residents of Squaw Gap, deep in the badlands of North Dakota, are now serviced with Stromberg-Carlson telephone system. Left, negotiations for phone hook-up were held in Squaw Gap's community hall;

center, Mrs. Ray Macik tries one of first instruments installed; right, Mel Leland explains dialing procedure to his family. Leland was among group that spearheaded negotiations with the Reservation Telephone Cooperative.

NEW PHONES EXCITE REMOTE SQUAW GAP RANCHERS

Not since 1916—when Buffalo Bill came to town and stumbled upon a cave full of skeletons—has there been such excitement in Squaw Gap, North Dakota.

The reason is telephones.

After years without them, Dakota cattle ranchers residing in the prairie and butte country on the eastern Montana border last week joined the 92 per cent of other American householders linked by phone.

For Squaw Gappers, however, the winning of the west came a lot easier than getting tied telephonically into 20th century America.

Since the days when other parts of the nation could exchange an Indian-head nickel for a cross-town connection, cattlemen in southwest McKenzie County have been fighting—and losing—countless conflicts with red tape and bureaucratic hatchets.

Only recently did the tide of battle turn, thanks to reinforcements from a rural telephone cooperative, the Department of Agriculture, and the Stromberg-Carlson subsidiary of General Dynamics.

So what's been the problem?

In an area where there are 200 miles of telephone line to install and only 100 subscribers, basic economics discouraged the investment of private dollars—compounded by the need for poles and heavy aerial cable in a territory where seasonal temperatures vary by 150 degrees and blizzards are a way of life.

True grit finally paid off after a 30-year community effort, when cattlemen met in May, 1970, with officers from the Reservation Telephone Cooperative—a 120-mile distant independent that already served 3,200 customers (including three Indian tribes) through 13 rural exchanges.

The session was held in Squaw Gap's one-room community hall, a weather-beaten 60-year-old ex-general store that now serves as polling place, 4-H clubhouse and dance hall ("Dances \$15—or \$10: If you Clean Up Yard Yourself").

Reservation Telephone's manager Fred Ahlgren recalls the day was "a huge success with about 85 people and food for 285" on hand. ("Every man and his dog was there," says 81-year-old cattleman Joe Wheeling.) Ahlgren listened sympathetically and pocketed a petition with 85 signatures.

Eighteen months later, Reservation Telephone is spending about \$4,300 per subscriber—more than seven times the national average—to bring service to Squaw Gap.

Ahlgren says "we wouldn't have stood a chance" without the 2 per cent interest rate (35 years) on a loan from the Agriculture Department's Rural Electrification Administration (REA).

"At that, this is strictly a break-even venture," he says. "But we think it's important that these people get telephones."

Squaw Gap's equipment will be a private-dial system with a 110-line

capacity served by an all-underground weatherproof cable. Stromberg-Carlson, which has supplied telephones and switching equipment to three-fourths of REA's 1.4 million new-service beneficiaries, gave this one priority. After checking its engineering, production, and installation plans against the McKenzie County almanac the General Dynamics subsidiary assigned the job a "critical" status, shaved six weeks off an already tight schedule, and promised a mid-December "cut-over."

"Pushing the order ahead was our Christmas present to Squaw Gap," said Maynard Knapp, Stromberg's manager of REA sales. "We wanted telephone service to arrive ahead of the first real winter storm."

The switching equipment for the telephones is located in a 16x24-foot

unattended concrete exchange building that faces Squaw Gap's one-room, four pupil schoolhouse. An underground cable minimizes maintenance and eliminates eyesore.

More excited than most is 43-year-old wheat-grower Ray Macik, who helped spearhead the successful negotiations with Reservation Telephone. Another key figure was Mel Leland, a lean, tenacious 27-year-old cattleman who says he was "spoiled" by having access to a telephone during his four years at North Dakota State University.

Near one corner of Macik's spread is the cave that was discovered on a hunting trip 55 years ago by Buffalo Bill Cody and six McKenzie County cronies. Buried at the back of the 20-foot cave was an altar, a crucifix, the bore of a flintlock musket, and parts

of three human skeletons. Imbedded in one skull was the point of a stone knife. The who, why and when still remain a mystery.

Elsewhere in Squaw Gap, the new underground telephone cable parallels a one-grave cemetery occupied by Poker Jim, an 1894 rancher who froze to death by the roadside following a winter's afternoon salooning. By the time his cowpoke pals had saddled him to a nearby blacksmith's shop, the story goes, it was too late to do anything but store the corpse in the rafters. There it stayed until a midnight poker game weeks later when, thawed by an oil lamp, Jim broke up the game by falling into a \$12 kitty.

"Poker Jim was probably one of Squaw Gap's earliest communication victims," says Macik. "Anywhere else he could have called a cab."

'Programme Excellence' Helps Motivate Canadair

In January, 1969, Canadair introduced "Programme Excellence" in its manufacturing areas as a means of improving performance and productivity while still delivering a top quality product on schedule and within budget.

The symbol chosen to represent the bilingual program is based on the zodiac Leo, representing the lion, one time used by master craftsmen to denote that a product was of the finest quality and was pure gold or silver.

Similar in many respects to the well known Zero Defects (ZD) program, Programme Excellence was introduced gradually throughout the plant, until all manufacturing departments participated in a monthly competition.

To show top management appreciation, monthly visits are made by the president of Canadair and the vice-

president-operations to the winning department to meet and congratulate each employee.

"This has been a major factor in maintaining enthusiasm for the success of the program," according to Frank Clarke, program administrator. "Employees are motivated to 'Do It Right the First Time.' This sense of participation and personal involvement from president to maintenance man has paid handsome dividends in the improvement of quality, productivity and in cost avoidance."

During the first year of operation, avoidance of rejects and snags, which can seriously affect schedule performance and quality, was estimated to have saved some \$1.5 million. In 1970 the cost avoidance was \$1.3 million, which continues to be maintained. Performance and quality have improved despite the drastic reduction in manpower and interest remains at a very high level. The 1971

goal of 4 per cent rejects has been more than met.

"It is difficult to single out any one department as a glowing example of efficiency because there are now so many that could fill this slot. However, the outstanding example of Programme Excellence at work is Dept. 382, C-5A ailerons," Clarke said.

The number of man-hours required to produce the ailerons has been cut to a fraction of the time required at the beginning of the contract. Nevertheless, productivity has not deteriorated, as shown by the fact that during the past seven months not a single reject has been recorded in this department.

Programme Excellence is by no means confined to the manufacturing areas; other departments such as engineering and quality assurance are equally involved. These departments set their own goals and compete in their achievement.

David Lewis Elected Chairman of AIA Board of Governors

David S. Lewis, Chairman and Chief Executive Officer, General Dynamics Corp., has been elected chairman of the board of governors of the Aerospace Industries Association. He succeeds Dr. Russell D. O'Neal, president of Bendix Aerospace-Electronics Group, Bendix Corp.

Paul Thayer, chairman of the board, president and chief executive officer, Ling-Temco-Vought, Inc., was named vice chairman of the board.

Karl G. Harr, Jr., was re-elected president of AIA. Other officers elected were: Samuel L. Wright, vice president/secretary; C. R. Lowry, vice president; Carlyle H. Jones, vice president-public affairs; and George F. Copsey, treasurer.



FOR THE RECORD—Foreman Jim Daly-Pepper, left, and Lead Hand Frank Thiele of C-5A ailerons, Canadair, discuss finishing touches to departmental Programme Excellence Awards. The bilingual program was initiated in 1969.